CARNIVAL AMUSEMENT RIDE SAFETY REGULATIONS

TABLE OF CONTENTS

SUBCHAPTER 13. INFLATABLE RIDES

SUBCHAPTER 1. GENERAL PROVISIONS

5:14A-1.1 Title; scope; intent

(a) These rules shall be known and may be cited as Chapter 14A, Carnival-Amusement Rides of Title 5, N.J.A.C.

(b) The purpose of this chapter is to provide reasonable standards for the design, construction and operation of amusement rides for the safety of the public.

(c) No person shall manufacture or sell for use in this State, operate, arrange for or cause to be used any ride that is not in compliance with this chapter.

1. No person shall change a ride in any way that makes the ride less conforming with the provisions of this chapter.

(d) This chapter shall apply to:

1. An amusement ride subject to the Carnival-Amusement Ride Safety Act, N.J.S.A. 5:3-31 et seq.;

2. An amusement ride as defined in N.J.A.C. 5:14A-1.2;

i. Amusement ride shall include a water slide exceeding 15 feet in height with the height of a water slide calculated as the difference in elevation between the highest point on the sliding surface and the lowest allowable elevation of the water surface into which the slide discharges; and

ii. A water amusement ride as defined in N.J.A.C. 5:14A-1.2;

3. Any mechanical device which carries, conveys, or directs riders along, around, or over a fixed or restricted route or course for the purpose of giving its riders amusement, pleasure, thrills or excitement; and

4. Any rider or gravity propelled ride, including, but not limited to, any water slide or water-based recreation equipment when located in an amusement area or park in which there are other rides covered by the Act.

(e) This chapter shall not apply to:

1. A locomotive weighing more than seven tons, operating on a track the length of which is one-half mile or greater, the gage of which is three feet or greater, and the weight of which is at least 60 pounds per yard;

i. Such locomotives shall be under the jurisdiction of the New Jersey Department of Transportation for the purposes of safety inspection;

2. A manually, mechanically or electrically operated, coin-operated ride, which is customarily placed, singly or in groups, in a public location and which does not normally require the supervision or services of an operator; or

3. A rider- or gravity-propelled ride that is not a mechanical device, or is not limited to a fixed or restricted course, and is not located in an amusement area or park.

(f) Where there is a conflict between these rules and any referenced standard, these rules shall govern.

5:14A-1.2 Definitions

The following words and terms, when used in this chapter, shall have the following meanings unless the context clearly indicates otherwise or the term is redefined for a specific section or purpose.

“Acceleration” means the change in velocity per unit time. It is usually expressed in units of ft/sec^2 or m/sec^2. Acceleration is also expressed in its relation to the acceleration due to gravity at sea level. “One g” means acceleration that is the same as the acceleration due to gravity at sea level. (that is, a body subjected to one g would experience the equivalent of its own weight.)

“Acceleration, impact” means those accelerations with duration of less than 200 milliseconds (msec).

“Acceleration, sustained” means those accelerations with duration greater than 200 milliseconds.

“Accepted engineering practice” means that which conforms to accepted principles, tests, or standards of accredited authorized agencies, and to standards or generic principles and practices of safety engineering.

“Act” means the Carnival-Amusement Ride Safety Act, N.J.S.A. 5:3-31 et seq.

“ACI” means American Concrete Institute.

“Adult ride” see "major ride."

“AISC” means American Institute of Steel Construction

“Alteration” see "modification."

"Amended type certification" means a certification that is granted to the manufacturer by the Department after review of an application for modification of a type certification.

“Amusement ride” see "carnival-amusement ride."

“Amusement area or park” means any indoor or outdoor location where at least one amusement ride subject to the Act is available for use by the general public.

“Amusement park operator” means any person, firm or corporation that owns, leases, manages or operates an amusement park.

“ANSI” means American National Standards Institute

“ASCE” means American Society of Civil Engineers.

“ASME” means American Society of Mechanical Engineers.

“ASTM” means American Society for Testing and Materials.

"Automatic mode" means **t**he ability, after initialization, of the amusement ride or device to start, operate, move, etc. with limited or no operator intervention.

“AWS” means American Welding Society.

“Block system” means a system on an amusement ride with separate vehicles designed to limit the number of vehicles in a certain area of the ride.

“BOCA” means Building Officials and Code Administrators International, Inc.

“Book-on ride” means a ride that is not owned by the primary owner of rides being placed in use at the same amusement area.

"Carabiner” means a shaped metal device of spring loaded design with a gate used to connect sections of bungee cord, jump rigging, equipment, or safety gear.

“Carnival” means a mobile enterprise principally devoted to offering amusement or entertainment to the public in, upon, or by means of portable amusement rides or devices or temporary types of structures in any number or combination, whether or not associated with other structures or forms of public attraction.

“Carnival-amusement ride,” “amusement ride,” “carnival ride” or “ride” means any mechanical device or devices, including but not limited to, a water slide exceeding 15 feet in height, which carries or conveys passengers along, around, or over a fixed or restricted route or course for the purpose of giving its passengers amusement, pleasure, thrills, or excitement; and any passenger or gravity propelled ride when located in an amusement area, amusement park or water park in which there are other rides covered by P.L.1975, c. 105 (N.J.S.A. 5:3-31 et seq.), including all water slides in amusement areas or parks; provided, however, that this shall not include locomotives weighing more than seven tons, operating on a track the length of which is one-half mile or greater, the gauge of which is three feet or greater, and the weight of which is at least 60 pounds per yard.

“Carnival ride” see "carnival-amusement ride."

“CFM” means cubic feet per minute.

“Child” means a person 12 years of age or younger.

“Clearance envelope” means the area in and around an amusement ride which, under normal operating and riding conditions, provides a “safe zone” for the riding public.

“Closed” means, when used in reference to restraint devices, the position in which the restraint is intended to remain during the operation of the ride or device in order to restrain the patron(s).

“Commissioner” means the Commissioner of the Department of Community Affairs.

“Containment” means the features in an amusement ride or device that accommodate the patron for the purpose of riding the ride or device. This may include but is not limited to the seats, side

walls, walls or bulkheads ahead of the rider(s), floors, objects within the vicinity of the rider(s), restraint systems and cages.

"Critical structural or mechanical component" means a component whose failure will result in uncontrolled operation or movement of the ride or failure of the restraint system.

“Dead load” means the weight of the ride itself. Dead load does not fluctuate with respect to time.

“Department” means the Department of Community Affairs.

“DIN” means Deutsches Institut für Normung (English Language Version)

“Discontinuities” means any and all indications found during the course of non destructive testing. These indications include, but are not limited to, cracking, loss of thickness, undercutting of welds and lack of penetration.

“Dynamic load” means load that fluctuates with time because of the action of the ride during the ride cycle.

"Electrical (E)/Electronic (E)/Programmable Electronic Systems (PES) (E/E/PES)" means the following. "Electrical" refers to logic functions performed by electromechanical techniques (for example, electromechanical relay, motor driven timers, etc.); "electronic" refers to logic functions performed by electronic techniques (for example, solid state logic, solid state relay, etc.); and "programmable electronic system" refers to logic performed by programmable or configurable devices (for example, Programmable Logic Controller (PLC)). Field devices are not included in E/E/PES.

"Electro-sensitive protective equipment (ESPE)" means an assembly of devices or components working together for protective tripping or presence-sensing purposes.

“Emergency stop (e-stop)” means a shut down sequence(s), other than a normal stop, that brings the ride or device to a stop.

“EN” means the Europaische Norm. These standards may be obtained through the European Committee for Standardization, Central Secretariat, rue de Stassart 36, B-150 Brussels, Belgium.

“Fail-safe” means the characteristic of an amusement ride or component thereof that is designed in such a way that the normal and expected failure mode results in a safe condition.

"Fence" means a type of barrier consisting of, but not limited to, posts, boards, wire, stakes, or rails that is used to inhibit patrons from coming into undesirable contact with the moving portion or restricted portion of an amusement ride or device.

“First aid” means the one-time treatment or subsequent observation of scratches, cuts not requiring stitches, burns, splinters, contusions and minor complaints. For purposes of these rules, "first aid" shall not include first response to a serious injury.

“Force limiting” means, when used in reference to restraint devices, a characteristic that, regardless of the amount of force available from the system actuators, limits the amount of force applied to the patron(s).

"Gate" means a section of fencing that may be opened.

“GFCI” means ground fault circuit interrupter, a device capable of de-energizing a circuit or portion thereof within an established period of time when a current to ground exceeds some predetermined value that is less than that required to operate the over-current protective device of the supply circuit.

“Go-kart” or “go-cart” means a one or two rider self-propelled motor vehicle designed to convey riders along a restricted roadway while being operated and controlled by one rider who will be called the driver.

"Guardrail" means a system of building components located near the open sides of elevated walking surfaces for the purpose of minimizing the possibility of an accidental fall from the walking surface to the lower level.

"Hand mode" means the ability of the amusement ride or device to start, operate, move, etc. only with operator intervention.

"Handrail" means railing provided for grasping with the hand for support.

“Height restriction” means a stature requirement for riders to be permitted on a specific ride which is contained on the list of height restrictions maintained by the Department in accordance with N.J.A.C. 5:14A-2.2.

“High speed” means greater than 37.5 mph, 55 ft/sec or 16.8 m/sec.

“IBC” means International Building Code.

“Imminent danger” means a condition that presents an excessive risk of serious injury to riders.

“Impact” means a force or acceleration that occurs over a time span of less than 0.2 seconds.

“Individual approval” means an approval that is granted to an owner of an individual ride that is not type certified, which is granted by the Department after review of a ride application and is applicable only to that individual ride.

“Inflatable” means an amusement device that incorporates a structural and mechanical system and employs a high strength fabric or film that achieves its strength, shape, and stability by tensioning from internal air pressure.

“Inspection” means the physical examination of an amusement ride and relevant documentation by an inspector.

“Key component” means a component or system that has been designated by the manufacturer as requiring special fabrication, maintenance, inspection or operation due to its importance to the continued proper and safe operation of the carnival-amusement ride device.”

“Kiddie ride” means a ride designed primarily for riders weighing 90 pounds or less.

“Latched” means held securely against opening except by intentional action of the rider, operator or other means.

“Live loads” mean those loads produced by the use and occupancy of the ride, not including dead load or environmental loads. Live loads fluctuate with time, but not necessarily during one ride cycle.

“Locked” means held securely against opening except by intentional action of the operator or other means, not accessible by the rider.

“Major ride” or “adult ride” means a ride not classified as a "kiddie ride" or a "super ride" by the Department.

“Maintenance” means performing maintenance or inspections according to a maintenance or operational checklist.

“Manual release” means a hand or foot operated mechanism that allows for opening the rider restraint.

“Manufacturer” means a person who obtains type certification for a carnival-amusement ride and who has responsibility for the design and manufacture of any carnival-amusement ride to be used or installed in this State, or sold for use in this State, and includes any entity controlled by the manufacturer.

“Mechanical malfunction” means any breakdown that constitutes a structural failure of a load bearing element, mechanical or electrical failure of a drive or control system component or failure of a restraint system which materially compromises ride safety. Mechanical malfunction does not include a foreseeable malfunction that actuates a safety system.

“Modification” or “alteration” means any material change to a load-bearing structural member, a mechanical, electrical, hydraulic or pneumatic drive or control feature, or a restraint or other protective feature.

“Modify” means to make a modification.

“Nationally recognized testing agency” means a laboratory, such as the Underwriters’ Laboratories, Inc., or the Factory Mutual Engineering Corporation or any similar testing organization acceptable to the Department.

“NDT” or “non destructive testing” means to examine and evaluate parts, areas, or items for defects at or below the surface. The testing when required is done by a qualified individual and is done without harm or damage to the tested item.

“NDT statement” means a non-destructive testing plan or a statement from the manufacturer that NDT is not required.

“New Jersey serial number” means a unique identifying number assigned to each individual ride at the time that a permit is first issued for it, which remains with the ride as long as it exists in this State.

“New ride” means a ride of a type that has not previously been assigned a type certification by the Department, that has not obtained individual approval or that does not have a New Jersey serial number.

“NFPA” means the National Fire Prevention Association.

“N.J.A.C.” means the New Jersey Administrative Code.

“N.J.S.A.” means the New Jersey Statutes Annotated.

“Operating manual” means the document that contains the required procedures and forms for the safe operation of an amusement ride at the stated site.

“Operator” see “ride operator”

“Operator assistant” means a person whose duties include, but are not limited to, loading and unloading riders, collecting tickets, checking seatbelts, lap bars and other restraints and occupying the entrance or exit areas to prevent intrusion while ride is in operation, but who is not the primary operator.

“Operator presence device” means a device which, when activated, requires an operator to remain in contact with the switch during the entire ride cycle.

"Over speed" means a condition present when a ride achieves a speed, whether forward or reverse, that is faster than the approved manufacturer's safe operating speed.

“Owner” means a person who owns, leases, controls, or manages the operations of a carnival-amusement ride, including individuals, partnerships, corporations, both profit and non-profit, and the State or any of its political subdivisions and their Departments and agencies.

“Passenger tramway” means a device used to transport riders in cars on tracks or suspended in the air, by the use of steel cables, chains, belts, or by ropes and usually supported by trestles or towers with one or more spans.

"Patron" see "rider."

“Permit” means a permit to operate an amusement ride issued annually by the Department.

“Person” includes corporations, companies, associations, societies, firms, partnerships, and joint stock companies as well as individuals, unless restricted by the context to an individual.

"Primary circulation area" means an area leading directly to the entrance or exit of a ride that is normally traveled by patrons. These areas would not include emergency exit routes, maintenance areas, or other areas not normally on the route of the patron.

“Qualified person” means an individual assigned by the owner who has the degree of competence necessary to perform the work on an amusement ride so that the ride will be safe. In the case of weld or metal crack inspections recommended or required by the manufacturer based on a safety bulletin, the qualified person shall be designated by the manufacturer or shall be an AWS Certified Weld Inspector or SNT-TC-1A Certified Level II or III Inspector, as appropriate.

“Reassembly” means the installation, erection, or reconstruction of an amusement ride following transportation or storage and prior to operation.

“Redundant restraint devices” means independent restraints in the sense that the secondary device, for example, lap bar, containment enclosure, etc., is able to restrain the patron in case of failure of the primary restraint.

“Repair” means to restore an amusement ride or ride component with like components or materials that meet or exceed current design specifications for the ride.

“Restraint” means the system, device or characteristic that is intended to inhibit or restrict the movement of the patron(s).

“Ride” see "carnival-amusement ride."

“Ride operator” or “operator” means any person or persons actually engaged in or directly controlling the operations of a carnival-amusement ride.

“Rider” or "patron" means a person riding on or utilizing an amusement ride.

"SAE" means Society of Automotive Engineers.

“Safety bulletin” means a supplemental notification delivered by the manufacturer or the holder of a supplemental modification certification to the owner that contains new information or new

recommendations for inspections, testing, repair, operation or training. For the purposes of ASTM F 853, this term includes, but is not limited to, Safety Alerts, Service Bulletins, and Notifications.

"Safety-related control system" means the hardware and software that controls the safety functions and components of the amusement ride or device as defined by the ride analysis.

“Serious injury” means any injury in which the injured person has lost consciousness, broken a bone, was transported to an emergency medical facility or an injury for which medical treatment by a physician beyond first aid was required.

“Service proven” means an amusement ride, device or modification to an amusement ride or device of which:

1. Units have been in service to the public for a minimum of five years; and
2. Unit(s) that have been in service have done so without any significant design related failures or significant design related safety issues that have not been mitigated.

“Super ride” means a ride designed to propel riders at high speed or acceleration in any direction which requires an accelerometer test according to the provisions of N.J.A.C. 5:14A-7.5.

“Supplemental modification certification” means a certification that is granted to a person other than the manufacturer by the Department after review of an application for modification of an individual approval.

"Time tested" means a type of amusement ride which is found by the Department to be simple in operation and impose insignificant forces on riders or which is service proven.

“Type certification” means a certification that is granted to a manufacturer by the Department after review of a new ride application and that is applicable to all rides of essentially the same design and manufacture with regard to structural, mechanical, electrical, hydraulic drive and control features, and restraint and other protective features.

"Use” means that an amusement ride is in operation, whether it is empty or carrying riders.

“Vehicle” means any carrier (for example, car, tub, tube, gondola, chair, capsule, compartment, etc.) on or in which riders are supported or contained and carried when participating in or riding on an amusement ride.

“Water amusement ride” means an amusement ride where water is used as an integral part of the ride and where it is expected that riders will get wet.

5:14A-1.3 Standards adopted

(a) The standards listed below are adopted and incorporated as part of this chapter. In the event that any provision in any of the following standards conflicts with a provision of this chapter, this chapter shall govern.

1. The following standards are adopted and are available from the American Concrete Institute, P.O. Box 19150, Detroit, Michigan 48219:

i. ACI 301 – 99, “Specifications for Structural Concrete for Buildings”;

ii. ACI 318 – 95, “Building Code Requirements for Reinforced Concrete”;

2. AISC, “Manual of Steel Construction ASD, 9th Edition,” is adopted and is available from the American Institute of Steel Construction, 400 North Michigan Ave., Chicago, Illinois 60611;

3. The following standards are adopted and are available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036:

i. ANSI B11.TR3, “Technical Report on Risk Assessment and Reduction”;

ii. ANSI B77.1 – 1999, “American National Standard for Passenger Ropeways, Arial Tramways, Arial Lifts, Surface Lifts, Tows and Conveyers - Safety Requirements”;

iii. ANSI/ASME B15.1, “Safety Standards for Mechanical Power Transmission and Conveyors and Related Equipment”;

4. ASCE 7 – 98, “Minimum Design Loads for Buildings and Other Structures,” is adopted and is available from the American Society of Civil Engineers, 1801 Alexander Bell Drive, Reston, Virginia 20191-4400;

5. The following standards are adopted and are available from the American Society for Testing and Materials, 100 Barr Harbor Drive, P.O. Box C700, W. Conshohocken, PA, 19428-2959:

i. ASTM E 84, “Test Method for Surface Burning Characteristics of Building Materials”;

ii. ASTM F 698-94, "Specification for Physical Information to be Provided for Amusement Rides and Devices";

iii. ASTM F 747-97, "Terminology Relating to Amusement Rides and Devices";

iv. ASTM F 770-93, "Practice for Operation Procedures for Amusement Rides and Devices";

v. ASTM F 846-92, "Guide for Testing Performance of Amusement Rides and Devices";

vi. ASTM F 853-98, "Practice for Maintenance Procedures for Amusement Rides and Devices";

vii. ASTM F 893-87, "Guide for Inspection of Amusement Rides and Devices";

viii. ASTM F 1159 97a, “Standard Practice for the Design and Manufacture of Amusement Rides and Devices”;

ix. ASTM F 1193-97, "Practice for an Amusement Ride and Device Manufacturer Quality Assurance Program";

x. ASTM F 1918, “Standard Safety Performance Specification for Soft Contained Play Equipment”;

xi. ASTM F 1957-99, "Test Method for Composite Foam Hardness-Durometer Hardness";

xii. ASTM F 2007-00, "Practice for the Classification, Design, Manufacturer, and Operation of Concession Go-Karts and Facilities"; and

xiii. ASTM F 2137-01, "Measuring the Dynamic Characteristics of Amusement Rides and Devices";

6. AWS D1.1, “Design of Welded Structures (Steel),” is adopted and is available from the American Welding Society, 550 N.W. LeJeune Road, Miami, Florida 33126;

7. CDC 95th percentile is adopted and is available from the National Center for Health Statistics at http://www.cdc.gov/growthcharts;

8. The following standards are adopted and are available from the MIT Press, 5 Cambridge Center, Cambridge, MA 02142-1493:

i. Dreyfuss Human Scale 4/5/6;

ii. Dreyfuss Human Scale 7/8/9;

9. The following standards are adopted and are available from the European Committee for Standardization, Central Secretariat, rue de Stassart 36, B-1050 Brussels, Belgium:

i. EN 954-1, "1 Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design";

ii. EN 1050, "Safety of Machinery Principles for Risk Assessment";

iii. EN 61496, "Safety of machinery - Electro-sensitive protective equipment";

10. IBC – 2000, "International Building Code," is adopted and available from the Building Officials and Code Administrators International, Inc., 4051 West Flossmoor Road, Country Club Hills, Illinois 60478-5795;

11. IEC 61508, "Functional safety of electrical/electronic/programmable electronic safety-related systems," is adopted and is available from the International Electrotechnical Commission 3, rue de Varembé, P.O. Box 131, CH - 1211 GENEVA 20, Switzerland;

12. ISO 4414, "Pneumatic Fluid power - General rules relating to systems," is adopted and is available from the National Fluid Power Association, 3333 North Mayfair Road, Milwaukee, Wisconsin 53222-3219;

13. NDS – 91, "National Design Specifications for Wood Construction," is adopted and is available from the American Forest and Paper Association, 1250 Connecticut Avenue/Suite 200, Washington DC 20036;

14. The following standards are adopted and are available from the National Fire Protection Association, 1 Batterymarch Park, Quincy, Massachusetts 02269-9101:

i. NFPA 10 1998, "Portable Fire Extinguishers";

ii. NFPA 70 2002, "National Electrical Code";

iii. NFPA 79 1997, "Electrical Standard for Industrial Machinery";

iv. NFPA 261 1998, "Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes";

v. NFPA 701 1996, "Methods of Fire Tests for Flame-Resistant Textiles and Films";

vi. NFPA 705 1997, "Recommended Practice for a Field Flame Test for Textiles and Films";

15. The following standards are adopted and are available from the National Fluid Power Association, 3333 North Mayfair Road, Milwaukee, Wisconsin 53222-3219:

i. NFPA/T2.24.1R1-2000, "Hydraulic fluid power - Systems Standard for Stationary Industrial Machinery";

ii. NFPA/JIC T2.25.1M-1986, "Pneumatic fluid power - Systems Standard for Industrial Machinery";

16. OIPEEC Standards, Organisation Internatiale Pour L'Etude De L'Endurance Des Cables International, are adopted and are available from The University of Reading, Department of Engineering, P.O. Box 225, Reading RG6 6AY, UK;

17. The following standards are adopted and are available from the SAE World Headquarters, 400 Commonwealth Drive, Warrendale, PA 15096-0001:

i. SAE J211, “Instrumentation for Impact Test—Part 1—Electronic Instrumentation”;

ii. SAE J833, “Human Physical Dimensions”; and

18. UL 508A, “Industrial Control Panels,” is adopted and is available from Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, Illinois 60062-2096.

SUBCHAPTER 2. GENERAL ADMINISTRATIVE PROVISIONS

5:14A-2.1 Title; scope; intent

(a) This subchapter of the regulations, adopted pursuant to authority of the Carnival-Amusement Rides Safety Act and entitled “General Administrative Provisions,” shall be known and may be cited throughout the rules as N.J.A.C. 5:14A-2, and when referred to in this subchapter may be cited as “this subchapter.”

(b) This subchapter establishes general administrative provisions related to classification of rides, fees, and the provisions of the application for an annual permit, type certification, amended type certification, individual approval, and supplemental modification certification applications.

(c) Before being placed in operation in this State, all rides shall have a valid type certification/amended type certification or individual approval/supplemental modification certification, as applicable, and a current annual permit.

(d) Information supplied in accordance with these rules shall be considered public information, except for information supplied by an applicant in support of a type certification, amended type certification, individual approval or supplemental modification certification application and designated by the applicant as proprietary. Documents that are submitted as proprietary shall be clearly stamped or marked as such. Documents not marked as such shall be considered public records.

1. For other than information supplied by the manufacturer for type certification applications, final determinations as to whether information contained in the Department's files shall be considered a public record shall be made by the Department consistent with P.L. 1963, c. 73 as amended by P.L. 2001, c. 404 and N.J.A.C. 5:3.

(e) When an amusement ride is rebuilt or is modified to change its original action, the ride shall be subject to all provisions of these rules as if it were a new ride not previously in use.

5:14A-2.2 Classification of and height requirements for rides

(a) The Department shall classify all amusement rides as “super ride,” “major ride,” “kiddie ride," or "inflatable ride.”

(b) The Department shall establish height requirements based on manufacturer's recommendations, design criteria, and shall reference height restrictions from nationally recognized publications.

1. The Department shall maintain a list containing approved height restrictions for rides.

2. For cases where the manufacturer's manuals do not include height restrictions, and for “major” or “super” rides, the default minimum height shall be 60 inches.

5:14A-2.3 Categories of certification and approval

(a) Each ride put into operation in this State shall be certified or approved in one of four categories, as follows:

1. Type certification: A type certification shall apply to all rides of the same type and design. The application shall be submitted by the manufacturer of the ride as provided in N.J.A.C. 5:14A-2.4.

2. Individual approval: An individual approval shall apply only to the specific ride reviewed and approved. The application shall be submitted by the owner of the ride as provided in N.J.A.C. 5:14A-2.5.

3. Amended type certification: An amended type certification shall be required when a ride that has a type certification is modified. The application shall be submitted by the manufacturer as provided in N.J.A.C. 5:14A-2.6.

4. Supplemental modification certification: A supplemental modification certification shall be required when a ride that has an individual approval is modified. The application shall be submitted by the owner of the ride as provided at N.J.A.C. 5:14A-2.7.

5:14A-2.4 Type certification

(a) A manufacturer may apply for type certification for any ride.

1. An application for type certification of a new ride shall comply with (b) below.

2. An application for type certification of a time tested ride shall comply with (c) below.

3. An application for type certification for an inflatable ride shall comply with N.J.A.C. 5:14A-13.3.

4. When a ride that has a valid type certification is modified, an application for an amended type certification shall be required and shall comply with N.J.A.C. 5:14A-2.6.

5. An application for a type certification shall be submitted a minimum of 60 days prior to the date that a ride is scheduled to be set up in this State.

6. An application for a type certification may be submitted by the manufacturer for a ride that has a valid individual approval.

i. Documentation shall be provided that demonstrates that the ride for which the individual approval has been issued is the same ride, without modification, as that for which the type certification is sought. In this case, an engineering review and, pursuant to N.J.A.C. 5:14A-2.8, an engineering review fee shall not be required.

7. When a ride with a valid type certification is sited in New Jersey, the fixed site and foundation requirements at N.J.A.C. 5:14A-2.13 shall apply.

(b) An application for a type certification for a new ride shall contain the following:

1. Demonstrated compliance with the design requirements of N.J.A.C. 5:14A-7;

2. Ride drawings that comply with N.J.A.C. 5:14A-2.12;

3. One complete set of ride design calculations signed and sealed by a licensed professional engineer. These ride design calculations shall include:

i. Calculations for the worst case environmental conditions in New Jersey; or

ii. Calculations for the limitations of the worst case environmental conditions the ride can stand.

(1) Where the ride is not designed to withstand the worst case environmental conditions, the conditions under which the ride can safely operate shall be provided.

(2) Where the ride is not designed to withstand the worst case environmental conditions, the conditions under which the ride may not operate, but may remain standing, and those under which the ride must be taken down or partially taken down, shall be provided.

iii. In an application for a type certification for a carnival ride for non-fixed site applications, calculations shall be required only for operational wind loads as environmental conditions.

iv. When an application for a type certification is submitted for a specific site, calculations for the specific environmental conditions shall be used.

4. A non-destructive testing statement pursuant to N.J.A.C. 5:14A-2.15;

5. A statement of compliance of redundancy on emergency brakes, anti-rollback devices, and other safety systems, if applicable;

6. Certification of design of ride;

7. Certification of the fabrication of the ride.

8. A full set of assembly, maintenance and operational manuals as required by N.J.A.C. 5:14A-2.14; and

9. A ride analysis as required by N.J.A.C. 5:14A-7.

(c) An application for a type certification for a time tested ride shall contain the following:

1. Documentation that the ride meets the definition of time tested;

2. A statement of compliance of redundancy on emergency brakes, anti-rollback devices, and other safety systems, if required; and

3. Certification of fabrication of the ride.

(d) Within 30 calendar days of receipt of a complete, accepted application, the Department shall send the applicant either a type certification or a denial of the application.

1. The denial shall be in writing and shall outline the reason(s) for such denial.

2. Failure to issue a type certification within 30 calendar days of the submittal of a complete application shall be deemed a denial for the purpose of appeal.

(e) Provided that the manufacturer supports the ride within the full meaning of these rules, a type certification shall be valid for a period of three years or until a new type certification or an amended type certification has been obtained.

1. An application to renew the amended type certification shall be required.

2. The renewal application shall comply with the rules in place at the time of the original application, except that safety bulletins issued since the original application shall govern.

3. The renewal of a type certification where there are no modifications to the ride shall not require an engineering review.

5:14A-2.5 Individual approval

(a) An owner of a ride may apply for an individual approval for a ride.

1. An application for an individual approval for a new ride shall comply with (b) below.

2. An application for an individual approval for a ride with a valid New Jersey serial number, carnival rides, and a fixed ride that has not been moved, or a fixed ride that has been returned to the same foundation shall comply with (c) below.

3. An application for a fixed ride with a valid New Jersey serial number, a fixed ride that has been moved, or a fixed ride that has not been returned to the same foundation shall comply with (d) below.

4. For a ride that has a valid type certification that the manufacturer is not renewing and where the ride meets all the requirements for that certification, the owner may apply for an individual approval without undergoing an engineering review.

5. An application for an individual approval for an inflatable ride shall comply with N.J.A.C. 5:14A-13.4.

6. An individual approval shall remain valid as long as the ride complies with the conditions on which the individual approval is based.

7. An application for an individual approval shall be submitted a minimum of 60 days prior to the date that a ride is scheduled to be set up in this State.

8. If the required documentation has been submitted to the Department for a specific ride, an applicant for an individual approval may submit a certification stating that the equipment is the same equipment described in the documentation already submitted and that no modifications have been made to the ride.

9. When a ride with an individual approval is sited in New Jersey, the fixed site and foundation requirements at N.J.A.C. 5:14A-2.13 shall apply.

(b) An application for an individual approval for a new ride shall contain the following:

1. Demonstrated compliance with the design requirements of N.J.A.C. 5:14A-7;

2. Ride drawings that comply with N.J.A.C. 5:14A-2.12;

3. One complete set of ride design calculations signed and sealed by a licensed professional engineer. These ride design calculations shall include:

i. Calculations for the worst case environmental conditions in New Jersey; or

ii. Calculations for the limitations of the worst case environmental conditions the ride can stand.

(1) Where the ride is not designed to withstand the worst case environmental conditions, the conditions under which the ride can safely operate shall be provided.

(2) Where the ride is not designed to withstand the worst case environmental conditions, the conditions under which the ride may not operate, but may remain standing, and those under which the ride must be taken down or partially taken down, shall be provided.

iii. In an application for an individual approval for a carnival ride for non-fixed site applications, calculations shall be required only for operational wind loads as environmental conditions.

iv. Where an application for an individual approval is submitted for a specific site, calculations for the specific environmental conditions shall be used.

4. A non-destructive testing statement pursuant to N.J.A.C. 5:14A-2.15;

5. A statement of compliance of redundancy on emergency brakes and anti-rollback devices, if applicable;

6. Certification of design of ride;

7. Certification of the fabrication of the ride;

8. A full set of assembly, maintenance and operational manuals as required by N.J.A.C. 5:14A-2.14; and

9. A ride analysis as required by N.J.A.C. 5:14A-7.

(c) An application for an individual approval for a time tested ride shall contain the following:

1. Documentation that the ride meets the definition of time tested;

2. A statement of compliance of redundancy on emergency brakes, anti-rollback devices, and other safety systems, if required; and

3. Certification of fabrication of the ride.

(d) An application for an individual approval for a ride with a New Jersey serial number, for carnival rides, and for a fixed ride that has not been moved, or that has been returned to the same foundation shall contain the following:

1. If not already submitted, non-destructive testing statement pursuant to N.J.A.C. 5:14A-2.15; and

2. If not already submitted, a full set of manuals required at N.J.A.C. 5:14A-2.14.

i. Exception: Where there is a valid type certification, the manuals required at N.J.A.C. 5:14A-2.14 shall not be required.

(e) An application for an individual approval for a fixed ride that has a New Jersey serial number, for a fixed ride that has been moved or has not been returned to the same foundation shall contain the following:

1. Ride drawings that comply with N.J.A.C. 5:14A-2.12;

2. If not already submitted, a full set of manuals required at N.J.A.C. 5:14A-2.14.

i. Exception: Where there is a valid type certification, the manuals required at N.J.A.C. 5:14A-2.14 shall not be required.

3. If not already submitted, a non-destructive testing statement pursuant to N.J.A.C. 5:14A-2.15; and

4. One set of ride design calculations signed and sealed by a licensed professional engineer for local environmental conditions.

(f) When a ride with a valid a type certification is modified and the manufacturer does not apply for an amended type certification, the owner may apply for an individual approval.

(g) Within 30 calendar days of receipt of a complete application, the Department shall send the applicant either an individual approval or a denial of the application.

1. The denial shall be in writing and shall outline the reason(s) for such denial.

2. Failure to issue a type certification within 30 calendar days of the submittal of a complete application shall be deemed a denial for the purpose of appeal.

(h) An individual approval shall remain valid as long as the ride complies with the conditions on which the approval is based.

5:14A-2.6 Amended type certification

(a) When a ride that has a valid type certification is modified, the type certification shall no longer apply. The ride shall be taken out of service or the manufacturer shall apply for an amended type certification.

1. For the modified portion(s) of the ride, the application shall be based on the rules in place at the time of the application for the modification.

2. For the unmodified portion(s) of the ride, the application shall be based on the rules in place at the time of the original application, except that safety bulletins issued since the original application shall govern.

3. When a ride with a valid a type certification is modified by the owner and the manufacturer does not apply for an amended type certification, the owner shall apply for an individual approval.

(b) The application for an amended type certification shall include the following:

1. One copy of the original type certification issued by the Department;

2. All supplemental safety bulletins, safety alerts, or notifications issued following the issuance of the original type certification; and

3. One full set of drawings, designs, specifications, and other construction documents, signed and sealed by a licensed professional engineer, that demonstrate compliance with the design requirements of N.J.A.C. 5:14A-7, that comply with N.J.A.C. 5:14A-2.12, and are necessary for a full and complete review of the ride modification.

4. The differences between the information submitted in support of the original type certification and that provided with the application for an amended type certification shall be clearly shown.

(c) Within 30 calendar days of receipt a complete application, the Department shall send to the applicant either an amended type certification or a denial of the application.

1. The denial shall be in writing and shall outline the reason(s) for such denial.

2. Failure to issue the certification within 30 calendar days of submittal of a complete application shall be deemed a denial for the purpose of appeal.

(d) Provided that the manufacturer supports the ride within the full meaning of these rules, an amended type certification shall be valid for a period of three years or until a new amended type certification has been obtained.

1. An application to renew the amended type certification shall be required.

2. The renewal application shall comply with the rules in place at the time of the original application, except that safety bulletins issued since the original application shall govern.

3. The renewal of an amended type certification where there are no modifications to the ride shall not require an engineering review.

5:14A-2.7 Supplemental modification certification

(a) When a ride with a valid individual approval is modified, the individual approval shall no longer apply and the owner of the ride shall take the ride out of service or apply for a supplemental modification certification.

1. For the modified portion of the ride, the application shall be based on the rules in place at the time of the application for the modification.

2. For the unmodified portion of the ride, the application shall be based on the rules in place at the time of the original application, except that safety bulletins issued since the original application shall govern.

(b) The application for a supplemental modification certification shall include the following:

1. One copy of the valid individual approval issued by the Department;

2. All supplemental safety bulletins, safety alerts, or notifications issued following the issuance of the individual approval; and

3. One full set of drawings, designs, specifications, and other construction documents, signed and sealed by a licensed professional engineer, that demonstrate compliance with the design requirements of N.J.A.C. 5:14A-7, that comply with N.J.A.C. 5:14A-2.12, and are necessary for a full and complete review of the ride modification.

4. The differences between the information submitted in support of the individual approval and that provided with the application for a supplemental modification certification shall be clearly shown.

(c) Within 30 calendar days of receipt a complete application, the Department shall send to the applicant either an amended type certification or a denial of the application.

1. The denial shall be in writing and shall outline the reason(s) for such denial.

2. Failure to issue the certification within 30 calendar days of submittal of a complete application shall be deemed a denial for the purpose of appeal.

(d) A supplemental modification certification shall remain valid as long as the ride complies with the conditions on which the certification is based.

5:14A-2.8 Fees

(a) At the time of application for an annual permit, a fee shall be paid as follows:

1. Super Ride $600
2. Major Ride $400
3. Kiddie Ride $200
4. Inflatable Ride $200

(b) When an application for a type certification/amended type certification or an individual approval/supplemental modification certification is submitted to the Department, the application fee shall be $200.

1. Exception: For a ride with a New Jersey serial number and an annual permit that was valid in the years of 2001 or 2002, no fee for an application for an individual approval shall be required if submitted within one year of the effective date of these rules.

(c) When an application for a type certification or individual approval is submitted to the Department and an engineering review is required, a review fee shall be paid as follows:

1. Inflatable rides $ 200
2. Rides $99,999 or less in value $1,000
3. Rides from $100,000 to $499,999 in value $2,000
4. Rides from $500,000 to $999,999 in value $3,000
5. Rides $1,000,000 and over in value $4,000

(d) When an application for an amended type certification or a supplemental modification certification is submitted to the Department that requires an engineering review, a review fee shall be paid. The fee shall be calculated as one percent of the cost of the modification, up to a maximum fee of $3,000. The minimum fee shall be $100.

(e) There shall be no engineering review fee for:

1. An application by a manufacturer for a type certification for a ride with a valid individual approval; or
2. A review of the documentation for a foundation for or the siting of a ride at a fixed location pursuant to N.J.A.C. 5:14A-2.13.

(f) No permit to operate, type certification, individual approval, amended type certification, or supplemental modification certification shall be issued until all applicable fees have been paid.

5:14A-2.9 Insurance, bond or other security

(a) No person shall operate a ride without:

1. A policy of insurance written on a per occurrence basis in an amount not less than $1,000,000 per occurrence insuring the owner against liability for injury suffered by persons riding the amusement ride; or
2. A bond in like amount; provided, however, that the appropriate liability of the surety under such bond shall not exceed the face amount thereof. The bond shall be in such form and content as to be acceptable to the Department of Banking and Insurance.

(b) The policy shall be issued by one or more insurers acceptable to the Commissioner of Banking and Insurance, and shall be either

1. Licensed to write insurance in the State of New Jersey; or
2. Approved as surplus lines insurers pursuant to section 11 of P.L. 1960, c. 32, the "Surplus Lines Law."

5:14A-2.10 Annual permits and issuance of serial number plates

(a) An annual permit shall be issued for the current calendar year or for a period of one year from the expiration of the last permit. No amusement ride shall be operated without a current, valid annual permit, except when:

1. The ride is covered by a valid annual permit from the prior year, the owner of the ride has applied for an annual permit in the current year, there are no outstanding orders against the ride, there is no outstanding documentation or fee, and an inspection is scheduled; or

2. An application for an annual permit for the ride has been submitted in the current year, there are no outstanding orders against the ride, all required documentation and fees have been received, reviewed, and accepted, and the ride has passed inspection, but the operator has not received the permit.

(b) Not less than 30 days before commencing operations and in each year thereafter, on a form supplied by the Department, an owner shall apply for an annual permit to place the ride in use.

(c) Each application for an annual permit shall include:

1. A certificate of insurance, bond, or other security demonstrating compliance with N.J.A.C. 5:14A-2.9; and

2. Payment of the appropriate fee, as provided in N.J.A.C. 5:14A-2.8. A check shall be made payable to "Treasurer, State of New Jersey."

(d) For rides with a New Jersey serial number, an application for an annual permit shall contain the following information and shall be submitted on a form provided by the Department.

1. The required proof of insurance and fee;

2. Documentation of required non-destructive testing performed during the past year, if completed. Documentation of required non-destructive testing not yet completed at the time of application shall be provided at the time of inspection; and

3. For an application to be complete and acceptable, there shall be no outstanding documentation required from previous years; and there shall be no outstanding violations.

(e) For rides without a New Jersey serial number, the information required in (c) and (d) above shall be submitted on a form provided by the Department together with the type certification/amended type certification number or individual approval/supplemental modification certification.

1. When the Department's review determines that the ride information is complete and accepted, a New Jersey serial number shall be assigned, the annual permit shall be printed, and the annual permit and a New Jersey serial number plate shall be sent via first class mail to the owner at the address of record.

(f) Within 30 calendar days of receipt a complete and accepted application, the Department shall send to the applicant either a notification of approval or denial of the permit application.

1. The denial shall be in writing and shall outline the reason(s) for such denial.

2. Failure to issue a determination within 30 calendar days of submission of a complete application shall be deemed a denial for the purpose of appeal.

(g) The annual permit issued by the Department shall be continuously displayed in the vicinity of the entrance to the ride or where the inspector affixed it. The permit shall be encased in such a manner as to be protected from weather conditions.

(h) A duplicate plate may be obtained from the Department at a cost of $100.00 for each plate.

(i) A duplicate permit may be obtained from the Department at a cost of $20.00 for each permit.

(j) A ride for which no foundation is required may be moved during the season without obtaining a new annual permit. In this case, the owner shall notify the Department of the move.

The ride shall be required to be inspected prior to being put back into use. Rides that are to be located on another structure shall comply with the siting requirements of N.J.A.C. 5:14A-2.13.
(k) When a ride for which a foundation is required is moved, it shall comply with the fixed site requirements of N.J.A.C. 5:14A-2.13 and shall obtain a new annual permit pursuant to this section.

5:14A-2.11 Inspections

(a) For all inspections, the owner, operator or manufacturer shall ensure that the ride is ready.

1. Where required, personnel shall be available to operate the ride at the scheduled inspection time.
2. Where required, power shall be provided to operate the ride.
3. If the ride is not ready at the time of the scheduled inspection, it shall be deemed to have failed the inspection. Another inspection shall be required to be scheduled.

(b) Following any pre-season or pre-operational inspection, the inspector shall provide a deficiencies list to the owner.

1. When the ride is presented as ready for opening to the public, any non-conformances from the deficiencies list that have not been corrected shall become violations and shall be included in an "Order to Cease Violations."

(c) Annual Inspection: An annual inspection shall be performed before a ride operates each year. The annual inspection shall include, but not be limited to:

1. A review of the maintenance records, including periodic check lists;
2. A review of operator training records;
3. A review of required non-destructive testing records if these records were not submitted with the application;
4. A complete mechanical inspection, which may require the ride to be partially disassembled;
5. An operating inspection, during which all safety systems shall be checked and the ride shall be cycled as it is during normal operation; and
6. A test and inspection of the full emergency brake or anti-rollback system, as applicable.

(d) Reassembly Inspection: The Department may perform a reassembly inspection at any new set-up. The reassembly inspection shall include, but not be limited to:

1. A review of the maintenance records including periodic check lists;
2. A review of operator training records;
3. A complete mechanical inspection, or at the discretion of the inspector, a partial inspection addressing only those portions disassembled; and
4. An operating inspection, during which all safety systems shall be checked and the ride shall be cycled as during normal operation.

(e) Acceptance Inspection: An acceptance inspection shall be performed before a new ride may operate. The acceptance inspection shall verify conformance with the approved design and shall include, but not be limited to, the following:

1. A review of the maintenance records, including periodic check lists, if applicable;
2. A review of operator training records and manufacturer certification;
3. A review of non-destructive testing records, when required;

4. A review of the certification that the manufacturer has tested the ride in accordance with ASTM F 846-92 and determined that the ride is satisfactory. This certification shall remain with the ride;

5. For fixed rides, an erection and assembly certification. This certification shall be retained in the ride file at the Department;

6. Those parts of the assembly process that are required to be witnessed of which the owner was notified during the permit process;

7. A complete mechanical inspection, which may require the ride to be partially disassembled;

8. A check of redundant safety systems; and

9. An operating inspection, during which all safety systems shall be checked and the ride shall be cycled as during normal operation.

(f) Operational Inspection: An operational inspection shall be performed several times each year. The operational inspection shall include, but not be limited to:

1. Observation of the ride operating when the operator has not been informed of the inspector's presence;

2. A review of operator training records; and

3. Information provided to the owner both verbally and in writing of the results of the inspection.

(g) Notwithstanding any appeal procedures of these rules, for any ride for which a permit has been suspended, the Department shall re-inspect a ride within 48 hours of receiving written notice from the owner of the ride that the condition or violation for which the permit was suspended has been corrected.

5:14A-2.12 Engineering review

(a) The Department shall perform engineering reviews in support of type certifications/amended type certifications and individual approvals/supplemental modification certifications. The manufacturer or owner, as appropriate, shall ensure that all documents submitted conform to accepted engineering practice and reflect sound engineering principals.

(b) Unless waived by the Department, ride drawings shall be required for all applications for type certifications/amended type certifications and individual approvals/supplemental modification certifications. All ride drawings submitted as part of an application shall clearly depict the following in appropriate views and cross-sections:

1. Dimensions and tolerances and other important characteristics;

2. General drawings or diagrams in plan, elevation, and section views showing the general arrangement of components and operating clearance envelopes;

3. Assembly and sub-assembly drawings that provide additional views of areas not clearly discernable from the general drawings and providing clear identification and specification of all components, including proper adjustment(s), fastener tightening specifications, descriptions of other materials or lubricants used, any other important information;

4. Detailed drawings of all components specifically manufactured for use in the amusement ride, device, or modification shall not be required unless a specific drawing is needed for verification. However, such drawings shall be available from the manufacturer as per N.J.A.C. 5:14A-5;

5. Illustrations or narrative, as appropriate, to provide a clear understanding of the function and relationship of each important part of the amusement ride, device, or modification;

6. Slewing gears, hoisting, and swiveling mechanisms, including their support arrangements, drives, controls, and lifting, and swiveling mechanisms;

7. Tubs, carriages, gondolas, or other devices illustrated in all necessary views and cross sections with details of the overall dimensions;

8. Vehicles or carriages with details of traveling, guide, safety, and upstop wheels, bearings, axles, shafts, and their attachments and possible ranges of motion in relation to the vehicle, steering and control, anti-rollback devices, drives, and mechanisms, brakes, and anchoring to the foundation;

9. Electrical, electronic, pneumatic, and hydraulic circuit and wiring diagrams; and

10. Control system documentation, including circuit wiring and logic diagrams.

(c) The manufacturer or owner shall provide to the Department and to the foundation designer a detailed list of maximum loadings on ground or foundation support locations.

(d) The manufacturer or owner shall provide the manuals required by N.J.A.C. 5:14A-2.14 as part of the ride design package.

(e) A special engineering review that focuses on a specific aspect of a ride may be undertaken by the Department to meet a specific need. Such a special engineering review may be undertaken in response to any of the following:

1. Accidents involving this ride or ride type;

2. A pattern of accidents or mechanical failures involving this ride or ride type;

3. Excessive maintenance or inspection(s) that may indicate a design defect;

4. The issuance of service bulletins, as described in these rules;

5. A serious defect found in the field during inspection; or

6. A modification from a type certification, amended type certification, individual approval, or supplemental modification certification.

5:14A-2.13 Foundations for and siting of rides at fixed locations

(a) Before any ride is sited for the first time or moved, a copy of the permit application submitted to the local Uniform Construction Code enforcement agency, including all plans and specifications, shall be submitted to the Department for review. The submission shall include the following:

1. Foundation drawing(s) and calculations signed and sealed by a licensed professional engineer or a letter signed and sealed by a licensed professional engineer certifying that the existing foundation, pad, or other support structure will support the ride in all design conditions;

2. A soil report for rides that require new foundation work; and

3. Site specific environmental information, if this information was not already submitted to the Department.

i. Site specific environmental information shall not be required for type certified rides when the type certification covers all environmental design conditions found in the State.

(b) After the ride is erected, but prior to opening to the public, the following information shall be submitted to the Department:

1. Certification of the erection and assembly of the ride; and

2. A copy of the Certificate of Occupancy or Certificate of Approval from the local Uniform Construction Code enforcement office.

(c) Before a mobile ride is set up for an extended period of time, the following information shall be submitted to the Department for review:

1. Documentation of the manufacturer's set-up requirements, including documentation regarding the environmental conditions under which the ride may safely operate and the environmental design conditions. When those conditions are exceeded, the ride shall be taken down; and

2. If the ride is to be sited on another structure, a letter or certification as required by (d) below.

(d) Before a ride of any type is sited or moved on another structure, a signed and sealed letter or certification from a licensed professional engineer stating that the structure will adequately support the ride in the proposed location in all design loading conditions shall be submitted to the Department for review.

5:14A-2.14 Manuals

(a) For each ride for which type certification/amended type certification, individual approval/supplemental modification certification, or an annual permit application is submitted, the applicant shall provide maintenance requirements, maintenance schedules, inspection requirements, and inspection schedules, each in a checklist format, as follows:

1. Operation Manual as per ASTM F 770-93 (Reapproved 2000);
2. Maintenance Manual as per ASTM F 853-98;
3. Erection and assembly manual or set-up and tear down manual; and
4. A quality assurance manual as per ASTM F 1193-97.

(b) Where there is no manufacturer to provide these manuals, the applicant shall submit to the Department manuals prepared by a licensed professional engineer or other qualified professional with training, experience, or certification pertaining to the inspection and evaluation of amusement rides that is acceptable to the Department.

1. When the applicant encounters practical difficulty in providing these manuals, the applicant may request that the Department approve a schedule for their submittal.

(c) Following the initial submission and acceptance of these documents, the annual application shall include only changes to the manufacturer's maintenance recommendations and operating instructions, if any.

(d) The manufacturer may submit these documents on behalf of all applicants who own or operate a particular ride.

5:14A-2.15 Non-destructive testing requirements and reports

(a) An application for a type certification/amended type certification or individual approval/supplemental modification certification shall include a copy of the non-destructive testing plan and operating instructions provided by the manufacturer. The non-destructive testing plan shall identify the components to be tested and the frequency for testing. The non-destructive testing requirements and schedules shall be in a checklist format and shall contain, at a minimum, the information required at N.J.A.C. 5:14A-9.24. All documentation submitted shall comply with ASTM F 846-92 (Reapproved 1998).

1. Where there is no manufacturer to provide the required documents, the applicant shall submit to the Department a non-destructive testing plan prepared by a licensed professional engineer or other qualified professional with training, experience, and certification pertaining to the inspection and evaluation of amusement rides that is acceptable to the Department.

2. When the applicant encounters practical difficulty in providing these documents, the applicant may request that the Department approve a schedule for the submission of the required documents.
(b) The non-destructive testing plan shall include provisions for the non-destructive testing of critical structural and mechanical components, such as, but not limited to, journals, shafts, spindles, and pins not visible to the naked eye.
(c) The manufacturer may submit these documents on behalf of all applicants who own or operate a particular ride.

5:14A-2.16 Variations
(a) An owner or manufacturer may apply for a variation from these rules.
(b) An application for a variation shall be in writing on a form prescribed by the Department.
(c) The application for a variation shall include, but not be limited to, the following:
1. The requirement from which a variation is sought;
2. A description of the condition that causes the hardship in meeting the requirements;
3. The alternative that the owner or manufacturer will provide to meet the intent of the requirement; and
4. Documentation that the variation will not create a situation that is less safe than meeting the code requirement from which a variation is sought.
(d) An application for a variation shall be approved or denied by the Department in writing within 30 calendar days of submittal.
1. Failure to issue a variation or a denial within 30 calendar days of the submittal of a complete variation application shall be deemed to be a denial for the purpose of appeal.

SUBCHAPTER 3. RIDER RESPONSIBILITY

5:14A-3.1 Title; scope; intent
(a) This subchapter, adopted pursuant to authority of the Carnival-Amusement Rides Safety Act and entitled "Rider Responsibility," shall be known and may be cited throughout these rules as N.J.A.C. 5:14A-3, and when referred to in this subchapter may be cited as "this subchapter."
(b) This subchapter establishes the rider responsibilities as covered by the Act and these rules.

5:14A-3.2 Riders to comply with posted warnings and directions
(a) Each individual who rides a carnival-amusement ride shall comply with written warnings and directions posted by the operator of the carnival-amusement ride according to these rules. These include:
1. Height, weight, and size restrictions, if any, in accordance with N.J.A.C. 5:14A-9.34;
2. Rider warning signs in accordance with N.J.A.C. 5:14A-9.34;
3. Rider conduct signs in accordance with N.J.A.C. 5:14A-9.33; and
4. Any other signs or warning posted by the operator with the express intent to protect the safety and well being of riders, equipment and operators.

5:14A-3.3 Riders under the influence of alcohol or drugs
A rider shall not board or attempt to board any amusement ride if he/she is knowingly under the influence of any alcoholic beverage as defined in N.J.S.A. 33:1-1 or under the influence of any prescription, legend drug or controlled dangerous substance as this term is defined P.L. 1970, c.

226 (N.J.S.A. 24:21-1 et al.) or any other substance which affects the rider's ability to use the ride safely and to abide by the posted and stated instructions.

SUBCHAPTER 4. OWNER RESPONSIBILITY

5:14A-4.1 Title; scope; intent

(a) This subchapter, adopted pursuant to authority of the Carnival-Amusement Rides Safety Act and entitled " Owner Responsibility," shall be known and may be cited throughout the rules as N.J.A.C. 5:14A-4, and when referred to in this subchapter may be cited as "this subchapter."
(b) This subchapter establishes the responsibilities of the owner of an amusement ride regarding the safe operation and maintenance of amusement rides.

5:14A-4.2 Ride equipment

(a) No one shall install, operate or allow to be operated any ride that does not have a current type certification, individual approval, supplemental modification certification or amended type certification issued pursuant to the requirements of this chapter.
(b) No one shall modify any ride with a New Jersey permit, individual approval, or type certification without undergoing an engineering review for a modified ride and getting a supplemental modification certification or an amended type certification, as appropriate.
(c) Existing equipment shall be maintained in accordance with this chapter.

5:14A-4.3 Annual permit application

(a) Each year, 30 days before commencing operations and in each year thereafter or, for continuously operated rides, 30 days prior to the beginning of a new year, the owner shall apply for a permit on an application form furnished by the Department.
(b) The application for an annual permit shall include all information required pursuant to N.J.A.C. 5:14A-2.10.

5:14A-4.4 Application for individual approval and grandfathering

(a) If a carnival–amusement ride was manufactured prior to the effective date of these rules, or if type certification is not renewed by the manufacturer or is revoked by the Department, then the ride shall not be operated, installed, or used in the State unless the owner has obtained an individual approval from the Department.

1. For rides that have a valid type certification that the manufacturer is not renewing, the owner may apply for an individual approval pursuant to N.J.A.C. 5:14A-2.4 without undergoing engineering review.

2. For rides that have a New Jersey serial number and had an annual permit in the year of or the year prior to the effective date of these rules, but are not type certified, the owner may apply for an individual approval pursuant to N.J.A.C. 5:14A-2.5 without undergoing an engineering review.

(b) For rides not grandfathered under the provisions of (a) above, the owner shall make application for individual approval of the ride as a new ride. The application for an individual approval shall include the information required by N.J.A.C. 5:14A-2.5 and the ride shall undergo engineering review according to the applicable provisions of this chapter. The fees for these reviews will be consistent with type certification review fees.

1. Pursuant to N.J.A.C. 5:14A-2.1, information supplied by the owner in support of an individual approval application that has been designated by the manufacturer in an application for a type certification as proprietary shall be considered proprietary.

5:14A-4.5 Compliance with manufacturer's recommendations for modifications

(a) An owner shall comply with any manufacturer's recommendation or requirement including, but not limited to, the replacement or modification of a component of the ride, a change or addition to the maintenance schedule for a ride or the performance of a test on a ride.

1. A copy of all manufacturer's bulletins or recommendations received by the owner shall be forwarded to the Department within 14 days of receipt by the owner unless the ride has a current type certification, in which case the manufacturer shall be responsible for sending such information to the Department.

2. The Department may waive the requirement to implement a manufacturer's recommendation, at the owner's request, if failure to implement the recommendation does not jeopardize public safety.

5:14A-4.6 Assembly or disassembly

(a) The assembly or disassembly of an amusement ride shall be done in accordance with the applicable requirements of N.J.A.C. 5:14A-9 by or under the immediate supervision of a qualified person.

(b) Assembly work shall be performed in a proper and workmanlike manner. Parts shall be properly aligned, and shall not be bent, distorted, cut or otherwise injured to force a fit. Parts requiring lubrication shall be lubricated in the course of assembly. Fastening and locking devices, such as bolts, caps, screws, cotter pins and lock washers shall be installed where required for safe operation. Nuts shall be drawn tight, cotter pins shall be spread and lock nuts firmly set.

(c) Parts which are excessively worn or which have been materially damaged shall not be used. Close visual inspection of parts shall be made during assembly to discover such wear or damage and immediate inspection of fastening devices shall be made after assembly to assure that they have been properly installed.

(d) Persons engaged in the assembly or disassembly of amusement rides shall use tools of proper size and design to enable work to be done in a proper manner. Broken, damaged and unsuitable tools shall not be used.

(e) Assembly or disassembly of amusement rides shall be done under light conditions adequate to permit the work to be properly performed and inspected.

(f) A sufficient number of persons to do the work properly shall be engaged for the assembly or disassembly of amusement rides. The public shall be prevented from entering the area in which the work may create a hazard.

(g) The owner of an amusement ride shall comply with the manufacturer's assembly/construction manual for the assembly and disassembly of the ride. The manufacturer's assembly/construction manual shall be kept with the amusement ride and shall be available for use by the Department.

5:14A-4.7 Daily inspection, test and maintenance and inspection records

(a) An amusement ride shall be inspected and tested on each day of intended use. The inspection and test shall be made by a qualified person experienced and instructed in the proper

assembly and operation of the device and shall be performed before the ride is put into normal operation.
(b) The inspection and test shall be based on any manufacturer requirement and shall include but not be limited to the operation of control devices, speed-limiting devices, brakes and other equipment provided for safety.
(c) A record of all maintenance, inspections and tests shall be made at once upon completion of the test and inspection, and shall be kept with the device and available to the Department for at least three years.
(d) The owner shall retain up to date records of all maintenance, inspections and tests including those required by these regulations or by the manufacturer for each amusement ride at the carnival-amusement site. These records shall contain, at a minimum, the following information:

1. The date and nature of all tests, including who conducted them, why, and the result of the test;
2. The date and nature of all inspections, including who conducted them, why, and the result of the inspection;
3. The date and nature of all maintenance, including who did it, and why; and
4. The date and nature of all breakdowns or repairs of a mechanical part, who completed the repair, and a reference to the manufacturer's procedure used to effect the repair. If this is a new procedure, the Department shall be notified, in writing, of the new procedure and the new procedure shall be added to the permanent record of the ride.

5:14A-4.8 Training and certification of ride operators

(a) The owner shall ensure that all operators comply with the requirements of N.J.A.C. 5:14A-9.8 and 9.9.
(b) The owner shall ensure that, at the time of initial operation in the State, at least one operator trained by the manufacturer and having a certification from the manufacturer, in a format prescribed by the Department, is operating the ride.
(c) The owner shall ensure that operators are trained to operate the ride based on manufacturer requirements covered by the operational manual and any supplemental safety bulletins, safety alerts or other notices related to operational requirements.
(d) The owner shall ensure that ride operators operate no more than one ride at any given time.
(e) The owner shall ensure that operators give full attention to any ride they operate.
(f) The owner shall ensure that anyone who operates a ride shall have demonstrated the ability to operate the ride in compliance with all applicable requirements of this chapter and shall ensure that each operator has signed a ride–specific certification attesting that the operator:

1. Has read and understood the manufacturer's recommendations for the operation of the ride and, if applicable, any operations manual provided by the owner.
2. Knows the safety-based limitations, including height, weight or other rider requirements, on who may ride the ride;
3. Is well versed on what could be reasonably expected to go wrong, how to recognize it, and how to get the ride and riders into as safe a position as possible to minimize the risk of injury or damage;
4. Has had adequate training to operate the ride;
5. Knows how to do the pre-startup operational ride checks as required by the manufacturer or as established by the owner in compliance with this chapter;

6. Knows how to verify that the daily maintenance checklist has been done prior to operating the ride; and

7. Has knowledge of the use and function of all normal and emergency operating controls and the proper use of the ride.

5:14A-4.9 Insurance, bond or other security

No person shall operate a ride without insurance as required by N.J.A.C. 5:14A-2.9.

5:14A-4.10 Riders under the influence of alcohol or drugs

The owner of an amusement ride may not permit a person who is perceptibly or apparently under the influence of alcohol or drugs to enter or ride an amusement ride.

5:14A-4.11 Rider accident reporting requirement

The owner shall designate an office or location as a site for reporting accidents or injuries. The office shall be open during normal business hours and shall be marked with clear signage. Forms with the minimum required information (see N.J.A.C. 5:14A-4.13(c)) shall be available for riders to fill out at this location. More than one office or location may be required so that the locations are within reasonable walking distance from any ride.

5:14A-4.12 Required notices of rider responsibility

(a) Signs advising of the rider reporting requirement (see N.J.S.A. 5:3-57) in English, and in at least one other language prevalent among riders, shall be posted in areas where rides covered by this chapter are operating, including all entrances, exits, locations for receiving forms and the first aid station(s).

(b) Each ride owner shall post warnings and directions for each ride which comply with manufacturer's requirements, N.J.S.A. 53-31 et seq. and this chapter. Such warnings shall be clearly legible and shall be in a conspicuous location.

(c) This sign shall be next to, above, below or may be combined with the required signs regarding accident reporting, rider conduct and warnings described in this section and in N.J.A.C. 5:14A-9.33 and 9.34.

5:14A-4.13 Accident, incident or mechanical breakdown reporting

(a) Shut down and report: When any incident occurs involving a death or serious injury, ejection from the ride or failure of a critical structural or mechanical component, regardless of cause, the owner shall:

1. Shut down the ride and secure the area;

2. Evacuate riders and provide care for any injured persons;

3. Report the incident to the Department immediately by telephone at the telephone number provided for this purpose; and

4. Prepare a written incident report and send it to the Department by telefacsimile at the telefacsimile number provided for this purpose within 24 hours of the incident.

i. A copy of the report submitted to the Department shall be sent to the manufacturer.

(b) Report within 24 hours: When any incident occurs involving a ride-related injury requiring first aid, or any mechanical malfunction, or an emergency evacuation of the ride, the owner shall:

1. Report the incident to the Department within 24 hours of the incident by telephone or by telefacsimile at the numbers provided for this purpose;

2. Prepare a written incident report and send it to the Department by facsimile at a number provided for this purpose within five days of the incident or by mail at PO Box 808, Trenton, NJ 08625 postmarked within five days of the incident. The written incident report shall be on a form designed by the Department and shall include a description of any planned corrective action and a time frame for its completion; and

3. Repair the ride according to the manufacturer's instructions, if necessary, and submit a written report to the Department indicating the actions taken.

4. An evacuation due to an area-wide power failure or an evacuation at the normal discharge of the ride shall not be considered an emergency evacuation for purposes of this subsection.

i. The removal of an individual rider or riders at other than the normal discharge location at the rider's request or due to rider behavior and having nothing to do with the operation or functioning of the ride shall be recorded in accordance with (c) below.

(c) Record: When any incident occurs that is not covered by (a) or (b) above occurs involving any type of ride-related injury or complaint observed by the owner or operator or reported to the owner or operator by the rider, the owner shall keep a record of such incident, including pertinent information, in a for that is easy to access and read and that is readily available for inspection by the Department.

1. The information shall include at least the following:
   i. The name and address of the injured party;
   ii. The age and sex of the injured party;
   iii. A brief description of the injury;
   iv. The ride on which the injury occurred;
   v. The time, date and weather conditions when the incident occurred; and
   vi. A description of the incident.

2. The removal of an individual rider or riders as described in (b)4i above shall be recorded.

5:14A-4.14 Transfer of ownership

The owner of an amusement ride shall notify the Department when ownership is transferred to another owner. In such case, the new owner shall obtain a new annual permit and become responsible for the individual approval, if applicable.

SUBCHAPTER 5. MANUFACTURER RESPONSIBILITY

5:14A-5.1 Title; scope; intent

(a) This subchapter, adopted pursuant to authority of the Carnival-Amusement Rides Safety Act and entitled "Manufacturer Responsibility" shall be known and may be cited throughout the rules as N.J.A.C. 5:14A-5, and when referred to in this subchapter may be cited as "this subchapter."

(b) This subchapter establishes responsibilities for a ride manufacturer.

5:14A-5.2 General requirements

(a) The manufacturer shall ensure that all rides are designed and constructed in compliance with the requirements of N.J.A.C. 5:14A-7.

(b) The manufacturer shall affix a data plate to each ride in compliance with N.J.A.C. 5:14A-7.19.

5:14A-5.3 Ride type certifications

(a) The manufacturer shall apply for type certification, in accordance with the requirements of N.J.A.C. 5:14A-2.4, for each ride type to be used within this State.

(b) As provided at N.J.A.C. 5:14A-2.4, type certification shall be valid for a period of three years and may be renewed every three years provided that the manufacturer continues to support the ride within the full meaning of this chapter.

5:14A-5.4 Amended type certification

(a) The manufacturer shall submit an application for an amended type certification, in accordance with the requirements of N.J.A.C. 5:14A-2.6, for any modification to a ride that has a current type certification. The application package shall identify the differences from the information provided for the type certification.

(b) Amended type certification shall be valid for a period of three years and may be renewed every three years provided that the manufacturer continues to support the ride within the full meaning of this chapter.

(c) If, as determined by the Department, an amusement ride is materially rebuilt or so modified as to change its original action, then a new type certification or individual approval shall be required as if it were a new ride.

5:14A-5.5 Quality assurance manual

For rides being issued a type certified or individual approval, the manufacturer shall provide a quality assurance manual that is in compliance with ASTM F 1193-97.

5:14A-5.6 Retention of documents, drawings and calculations

All required quality assurance documents including, but not limited to, material certifications, test reports, inspection reports, drawings and calculations shall be retained by the manufacturer for at least the design life of the ride or 20 years from the date of last manufacture, whichever is longer, or until all such rides have been destroyed or scrapped. This shall include any ride that uses the documentation in question. The Department shall be notified six months prior to the destruction of such documents.

5:14A-5.7 Notification, bulletins and other information as required by the Department

(a) When the manufacturer is notified by an owner of an incident, whether in this State or elsewhere, involving a serious injury or a critical structural or mechanical component of a ride, the manufacturer shall promptly evaluate the information in that notification and, if necessary, provide, in the form of a safety bulletin, the results of that evaluation, together with any recommendations to eliminate or prevent the situation that created the incident, to the Department and to all known owners of the ride in the State.

(b) The manufacturer of a ride shall also provide to the Department and to all known owners of the ride in the State:

1. All bulletins, and notifications on type certified rides;

2. Information as necessary for those rides that have individual approval or supplemental modification certification based on the manufacturer's documentation supplied by the owner or responsible person; and

3. Other documents requested by the Department as a result of an incident involving a ride supported by the manufacturer, either directly or indirectly.

SUBCHAPTER 6. VIOLATIONS, PENALTIES, REMEDIES AND INVESTIGATIONS

5:14A-6.1 Title; scope; intent

(a) This subchapter, adopted pursuant to authority of the Carnival-Amusement Rides Safety Act and entitled "Violations, Penalties, Remedies and Investigations," shall be known and may be cited throughout the rules as N.J.A.C. 5:14A-6, and when referred to in this subchapter may be cited as "this subchapter."

(b) This subchapter establishes the procedures for owners, operators or manufacturers to follow upon receipt of an order of the Commissioner and establishes the amount of penalties and reasons for action and provides information on Department investigations.

(c) A violation of the Act occurs whenever an owner, manufacturer, officer, agent, employee or person interferes in any manner with the implementation of, or otherwise fails to comply with, the provisions of the Act or rules promulgated pursuant to the Act.

5:14A-6.2 Revocation of carnival-amusement ride permit, certification or approval

(a) Any owner may have his or her amusement ride permit or individual approval revoked for:

1. Incompetence;
2. Negligence;
3. Continuing to operate an amusement ride without the Department's authorization when an incident as described in N.J.A.C. 5:14A-4.13 occurs;
4. Failure to notify the Department of any incident as required by N.J.A.C. 5:14A-4.13;
5. The discovery of false, invalid, incorrect or fraudulent information related to the design of the ride or its safe operation;
6. Knowingly submitting false, invalid or fraudulent information that is not related to the design of the ride or its safe operation; or
7. Failure to comply with the Carnival-Amusement Ride Safety Act, N.J.S.A. 5:3-31 et seq., orders of the Commissioner, or this chapter.

(b) Any owner who has an amusement ride permit revoked pursuant to this section shall not operate the affected amusement ride until such permit is restored by the Department through the regular application process.

(c) Any manufacturer may have a type certification or amended type certification revoked for:

1. Failure to report incidents as required by N.J.A.C. 5:14A-5.7;
2. Repeated failure to issue safety bulletins required by the Department;
3. Repeated failure to supply requested engineering analyses;
4. The discovery of or knowingly submitting false, invalid, incorrect or fraudulent information related to the design or manufacture of a ride; or
5. Failure to comply with the Carnival-Amusement Ride Safety Act, N.J.S.A. 5:3-31 et seq., orders of the Commissioner, or this chapter.

(d) Any manufacturer who has a type certification or amended type certification revoked, after exhaustion of all available remedies at law, shall be prohibited to sell, erect, use or install that carnival-amusement ride in this State.

5:14A-6.3 Administrative penalties

(a) The Commissioner or the Commissioner's designee is authorized to assess and collect an administrative penalty in the amount of up to $5,000 for each violation.

(b) In determining the amount of the penalty, the following factors shall be considered:

1. Whether there has been a good faith attempt at full compliance;
2. The seriousness of the violation;
3. The past history of violations or non-compliance with orders;
4. Whether the violation was willful;
5. Whether the violation did cause or could have caused injury or bodily harm;
6. Whether the violation poses an imminent hazard to public health and safety; and
7. Any other appropriate factors.

(c) Each day in which the owner, operator or manufacturer operates a ride in violation of an order issued by the Department or allows a violation to continue, shall be considered a separate violation.

(d) Except as otherwise set forth in this section, no administrative penalty shall be levied pursuant to this section unless the alleged violator is provided with a notice and order to abate the violation, the amount of any penalty and an opportunity to request an administrative hearing. Penalties may be issued without prior notice to abate for the following violations:

1. Operating a ride without a permit;
2. Modification of a ride without approval by the Department;
3. Operating a ride in a manner likely to cause injury;
4. Submission or maintenance of false, invalid or fraudulent information;
5. Failure to cease operation after a serious incident;
6. Failure to report an incident; or
7. Failure to comply with an order of the Commissioner that is in the form of an express condition of a permit, individual approval, type certification, or amended type certification.

5:14A-6.4 Appeals and hearings

(a) A request for an administrative hearing shall be submitted, in writing, within 10 calendar days following the receipt of the notice or order. Hearing requests shall be addressed to: Hearing Coordinator, Department of Codes and Standards, P O Box 802, Trenton, New Jersey 08625-0802. All hearings shall be conducted pursuant to the Administrative Procedure Act, N.J.S.A. 52:14B-1 et seq., and the Uniform Administrative Procedure Rules, N.J.A.C. 1:1.

(b) When an aggrieved person fails to request a formal hearing within the 10 calendar day period specified in (a) above, his or her right to a formal hearing shall be deemed waived and the agency action shall become final.

(c) Recipients of an administrative penalty assessment may request the initiation of a settlement conference at the time that a hearing request is made. If a party requests a settlement conference, or the Department determines that a settlement conference might be useful, a settlement conference shall be scheduled and conducted by the Department within 30 days of the receipt of the hearing request.

(d) If a settlement is not agreed upon or no settlement conference is scheduled and a hearing has been requested, the matter shall be transmitted to the Office of Administrative Law (OAL) for hearing.
(e) Payment of the penalty shall be due when a final agency determination is issued or when a notification becomes a final decision because no appeal has been filed.
(f) All payments shall be made payable to the "Treasurer, State of New Jersey" in the form of a certified check or money order, or such other form of payment as may be acceptable to the Department.
(g) Upon final order, the penalty imposed may be recovered with cost pursuant to the Penalty Enforcement Law of 1999, N.J.S.A. 2A:58-10 et seq.

5:14A-6.5 Suspension or revocation of permit

(a) The Department may immediately suspend or revoke a permit, prior to a hearing, when it is determined that the violations listed in N.J.A.C. 5:14A-6.2 exist or that the continued holding of the permit, approval or certifications is otherwise a hazard to public health and safety. An owner or manufacturer may request an expedited hearing to contest any such suspension in accordance with the Administrative Procedure Act N.J.S.A. 52:14-14B-1 et seq. and the Special Hearing Rules at N.J.A.C. 1:12D.

1. In such cases, the Commissioner shall adopt, reject or modify the recommended decision of the Administrative Law Judge on the next business day following receipt of the Administrative Law Judge's decision. The Commissioner of Community Affairs' decision shall be final, subject to the right of the owner to appeal to the Superior Court of New Jersey, Appellate Division. The expedited hearing shall be held, and a final decision issued by the Commissioner, within 48 hours of receipt of a written request for such a hearing, except as extended with the consent of both parties.

2. Failure of the Department to transmit the hearing request to the Office of Administrative Law within one business day of the Department's receipt thereof shall be deemed to be a final agency decision.

3. Failure to issue a decision shall constitute denial of the appeal.

5:14A-6.6 Re-inspections following a suspension or shut down and investigations

(a) The Department shall issue a notice and order to cease operation for any amusement ride found to be hazardous or unsafe. Operation of the ride shall not be resumed until the ride has been re-inspected by the Department and found to be safe for operation unless the order allows operation to resume or unless re-inspection is waived by the Department.
(b) Notwithstanding any appeal procedures covered by this subchapter, the Department shall re-inspect any carnival-amusement ride for which a permit has been suspended within 48 hours of receiving written notice from the owner of the ride stating that the condition or violation for which the permit was suspended has been corrected. If upon re-inspection, the Department determines that the condition or violation has been corrected, the Department shall reinstate the permit immediately.
(c) When, as required by N.J.A.C. 5:14A-4.13, a ride has been shut down following an incident, the ride shall not operate until the Department issues an approval for operation.

1. Where a verbal approval to operate is given, it shall be followed by a written approval. The written approval may be sent via facsimile.

2. The Department shall investigate each of these incidents, and may require records, tests, and may take temporary possession of the ride or portions of it. In cases involving death or serious injury, the Department may issue and enforce subpoenas to compel the testimony of any person who may have knowledge of any relevant matters and the production of any relevant documents.

(d) The Department may request and the owner or manufacturer, as appropriate, shall provide documentation of repairs as specified in N.J.A.C. 5:14A-9.11.

5:14A-6.7 Departmental remedies for non-compliant manufacturers

(a) The Department shall have the authority to prohibit the sale, erection, use, or installation of any carnival-amusement ride in this State upon final determination, following exhaustion of all available remedies at law, that the manufacturer of the ride has repeatedly failed to comply with orders requiring engineering analyses to be prepared and submitted to the Department or safety bulletins to be issued for individual carnival-amusement rides or classes of carnival-amusement rides or upon final determination, following exhaustion of all available remedies at law, that the manufacturer has refused, on a repeated and egregious basis, to comply with orders to carry out the duties and obligations imposed by P.L. 1975. c. 105 (N.J.S.A. 5:3-31 et seq.) or this chapter.

1. For purposes of this section, the term "manufacturer" applies equally to the original manufacturer and to any successor or other person acting in the place of the manufacturer pursuant to these regulations.

SUBCHAPTER 7. DESIGN AND CONSTRUCTION

5:14A-7.1 Title; scope; intent

(a) This subchapter, adopted pursuant to authority of the Carnival-Amusement Rides Safety Act and entitled “Design and Construction,” shall be known and may be cited throughout the rules as N.J.A.C. 5:14A-7, and when referred to in this subchapter may be cited as “this subchapter.”

(b) This subchapter establishes minimum criteria, information and procedures for the design, manufacture and modification of amusement rides and devices.

1. Air-supported structures that include no other structural elements shall comply with the provisions of N.J.A.C. 5:14A-13.

2. Unmodified portions of modified rides, certified by the manufacturer or by the engineer as unaffected by the modification, shall not be required to comply with the provisions of this subchapter.

(c) In addition to the requirements set forth in this subchapter, all rides shall be designed to allow for compliance with any applicable provisions of N.J.A.C. 5:14A-9.

(d) Where there is a conflict between these regulations and any standard referenced in this subchapter, these regulations shall govern.

5:14A-7.2 General design criteria

(a) Ride Analysis: The manufacturer shall perform a Ride Analysis.

1. The Ride Analysis shall include the following:

i. A Patron Restraint and Containment Analysis performed in accordance with N.J.A.C. 5:14A-7.3;

ii. A Patron Clearance Envelope Analysis performed in accordance with N.J.A.C. 5:14A-7.4; and

iii. A Failure Analysis performed on the safety-related systems of the amusement ride or device. The Failure Analysis shall include Fault Tree Analysis, Failure Mode and Effect Analysis (FMEA) or other accepted engineering practices.

2. The Ride Analysis shall specifically include an assessment of the suitability of the design of the amusement ride or device for the intended patrons; including anthropomorphic factors, which relate age and physical size.

3. The Ride Analysis shall identify the most significant factors that may affect patron safety and shall include mitigation for each factor.

4. The Ride Analysis shall document the safety issues that were identified and the means used to mitigate each issue.

(b) Design and Calculations: The design and calculations shall show compliance with the design criteria of this subchapter. Calculations and assessments of the following types are required:

1. Calculations verifying the adequacy of structural, mechanical and electrical components;

2. Calculations of significant and predictable acceleration that is generated by the ride or device when operated as reflected in the manufacturer's provided operating and maintenance manuals or written instructions;

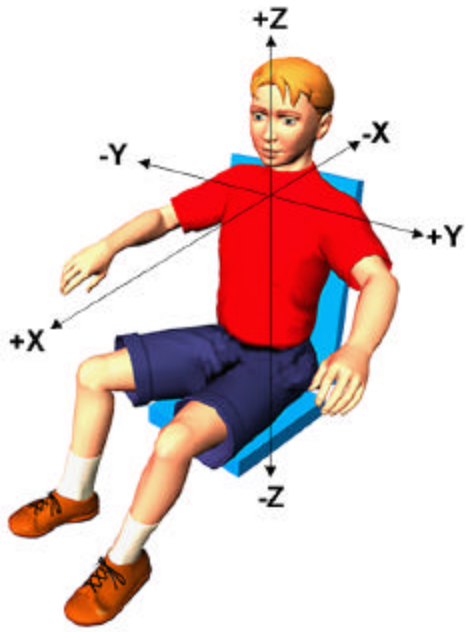
3. Performance and functional characteristics of control systems; and

4. Calculations for passenger and vehicles performed using coordinate axis in Figure 1 below and at the positions defined in ASTM F 2137-01, Standard Practice for Measuring the Dynamic Characteristics of Amusement Rides and Devices, or the EN equivalent.

(c) Units of measurement shall be clearly specified in all documentation.

1. The coordinate system shown in Figure 1 below shall be used as the standard reference for acceleration directions including the application of the different means of restraint in accordance with the criteria of the Restraint Diagram shown in Figure 2 in N.J.A.C. 5:14A-7.3.

Figure 1
Coordinate System of Accelerations



Note: There are three axes orthogonal to each other and are labeled X, Y, and Z. Positive X is taken toward the front of the chest with roll occurring about the X axis. Positive roll is determined by the right hand rule. Grasping the X-axis with thumb point toward the positive end, positive roll is defined by the direction of the curl of the fingers. Negative X is toward the back of the chest. The Y-axis runs shoulder to shoulder. Positive Y is defined toward the left side of the chest and negative Y toward the right. Positive Pitch is defined by the right hand rule using the Y-axis. The Z-axis runs through the head to the tailbone. Negative Z is toward the tailbone; positive Z is toward the head. Positive Yaw is defined by the right hand rule using the Z-axis. The center of the coordinate system is determined in accordance with ASTM F 2137.

(d) Drawings and records: The manufacturer or owner shall provide a full set of signed and sealed drawings, designs, specifications, and other construction documents necessary for a full and complete review of the new ride or modification to an existing ride as required by N.J.A.C. 5:14A-2.12.

1. If a voice communication or signal system is required under N.J.A.C. 5:14A-9.13, to the extent that the manufacturer has been involved in its development, it shall be included in the manufacturer's documentation to the Department.

5:14A-7.3 Patron containment and restraint

(a) Patron containment:

1. The amusement ride or device shall be designed to support and contain the patron(s) during operation. This support and containment shall be consistent with the intended action of the ride or device.

2. Parts of amusement rides and devices that patrons may reasonably be expected to contact shall be smooth, free from unprotected protruding studs, bolts and screws, sharp edges and corners, rough or splintered surfaces, and considered for padding as appropriate.

3. Ride or device vehicle doors:

i. When amusement ride or device patron vehicles are provided with doors, measures shall be taken to ensure that the doors do not open during operation, failure or in case of emergency, unless otherwise determined by the Ride Analysis.

ii. Powered doors shall be designed to minimize pinch points and entrapment areas. The doors (opening and closing) movement shall be controlled and the maximum exerted force, measured on the edge of the door at the furthermost point from the hinge or pivot, shall not exceed 30 pounds (133 Newtons (N)).

(b) Security of patron containment system:

1. Any system or systems used to support and contain the patron(s) shall be securely fixed to the structure of the ride or device and shall have adequate strength for the intended forces produced by the ride or device and the reasonably foreseeable actions of the patron(s).

(c) Patron restraints:

1. Patron restraints shall be provided based on the Patron Restraint and Containment Analysis and other criteria defined in this subchapter and shall take into consideration the nature of the amusement ride or device and the intended adult or child patron physical characteristics based on anthropomorphic data such as Dreyfuss Human Scale 4/5/6, 7/8/9 or SAE J833, and Center for Disease Control Growth Charts.

2. Restraint devices shall be provided in cases where it is reasonably foreseeable that patrons could be lifted or ejected from their seat or riding position by the acceleration of the amusement ride or device, or by seat inclination, during the ride or device cycle and other reasonably foreseeable situations, for example, the application of emergency brakes or vehicles stopped in inverted positions.

3. Where kiddie rides or devices do not provide fully enclosed compartment (that is, so as to reject a four inch diameter sphere at all openings), a latching restraint shall be provided unless the Patron Restraint and Containment Analysis indicates a locking restraint is needed or a restraint is not appropriate (for example, a kiddie canoe ride). For either latching or locking restraints, the final latching or locking position shall be adjustable in relation to the patron.

4. The Patron Restraint and Containment Analysis may identify the need for a restraint system for reasons other than acceleration or seat inclination. The analysis shall also evaluate the need for locking or latching functions when restraints are required.

5. A manual restraint release shall be provided for authorized personnel use.

i. The manual release should be conveniently located and easily accessed by authorized personnel without crawling over, under or otherwise coming in direct contact with the patrons.

ii. External or unmonitored internal non-mechanical stored energy, for example, battery, accumulator, hydraulic or pneumatic, shall not be used for a manual release unless otherwise determined by the Ride Analysis.

iii. Special tools shall not be required to operate the manual release unless otherwise determined by the Ride Analysis.

6. The design shall take into consideration the evacuation of patrons from any reasonably foreseeable position or situation on the ride or device including emergency stops and stops in unplanned locations. The Patron Restraint and Containment Analysis shall address whether

individual or group restraints releases are appropriate. The design for emergency evacuation shall be such that riders shall be kept safely on the ride or shall be safely evacuating.

7. The design shall specify the state, locked or unlocked, of the restraint system in the event of unintended stop, for example, emergency stop or loss of power. This specification shall be based on the results of the Ride Analysis.

8. Restraints shall be designed such that the opportunity for pinching or unintentional trapping of fingers, hands, feet and other parts of the patron's body is minimized.

9. The maximum exerted force produced by any powered patron restraint device while opening or closing shall not be more than 18 pounds (0.08 kiloNewtons (kN)), measured on the active surfaces contacting the rider. Force limiting systems, if used to achieve this, shall be configured so that the failure of any one element of that system will still result in force being limited to 18 pounds (0.08 kN).

10. The design shall take into account the patron induced loads, for example, bracing, etc., in addition to the loads and criteria specified in this subchapter.

11. The physical information provided in accordance with ASTM F 698-94 shall be consistent with the patron restraint system, if any.

(d) Restraint configuration:

1. The Restraint Diagram shown in Figure 2 below shall be used as part the Patron Restraint and Containment Analysis for determining if a restraint is required and if required, what type. The Restraint Diagram identifies and graphically illustrates five distinctive areas of theoretical acceleration. Each of the five distinctive areas may require a different class of restraint as indicated in this subchapter. The Restraint Diagram applies for "sustained acceleration" levels only. It is not to be applied for "impact acceleration."

2. The application of the Restraint Diagram is to be used in connection with the Ride Analysis or other factors or requirements of this subchapter. Where indicated, another class of restraint shall be provided. The following needs shall be taken into consideration in designing the restraint system:

i. Duration of the acceleration;
ii. Height of the patron carrying device above grade or other objects;
iii. Wind effects;
iv. Unexpected stopping positions of the patron units, for example, up side down;
v. Lateral accelerations, for example, where lateral accelerations are equal to or greater than 0.5 g's, special consideration shall be given to the design of seats, backrest, headrest, padding and restraints; and
vi. The intended nature of the amusement ride or device.

(e) Any ride where it is possible for a rider to slide laterally shall be designed to adequately and safely contain the rider in the ride. When designing ride pieces which riders will slide into, the design shall account for the rider and any fellow riders who will be sliding into those pieces while being contained by the ride.

(f) Restraints shall not be required for water slides, wave pools, water play areas, lazy rivers or other, similar rides.

(g) Where restraints are required because of the dynamics of the ride or elevation of the ride, they shall not be able to be unlocked by the riders.

(h) If Gx exceeds +0.2 g for more than 0.2 seconds, a backrest shall be required. If Gx exceeds +0.5 g for more than 0.2 seconds, a full backrest shall be required. If Gx exceeds 1.5 g for more than 0.2 seconds, see Note 1 on Figure 5 in N.J.A.C. 5:14A-7.5. If +Gx exceeds +2.5 g for more

than 0.2 seconds, a headrest, which discourages both lateral movement and movement away from the headrest, shall be required. As used in this subsection, a backrest does not allow a person to slide off the seat backwards. A full backrest supports the torso up to the shoulders. A headrest supports the back of the head.

(i) Unless the ride analysis indicates otherwise, if there are accelerations in the X or Z direction that exceed 1g or Gy exceeds 0.5 g in either direction, there shall be hand holds (including, for example, the lap bar) with a 1-1/2 inch maximum diameter for the riders to grasp to help support themselves.

(j) For any ride in which accelerations exceed 2 g or are less than –2 g in any direction, the rider shall be well and closely restrained in the direction to resist the acceleration.

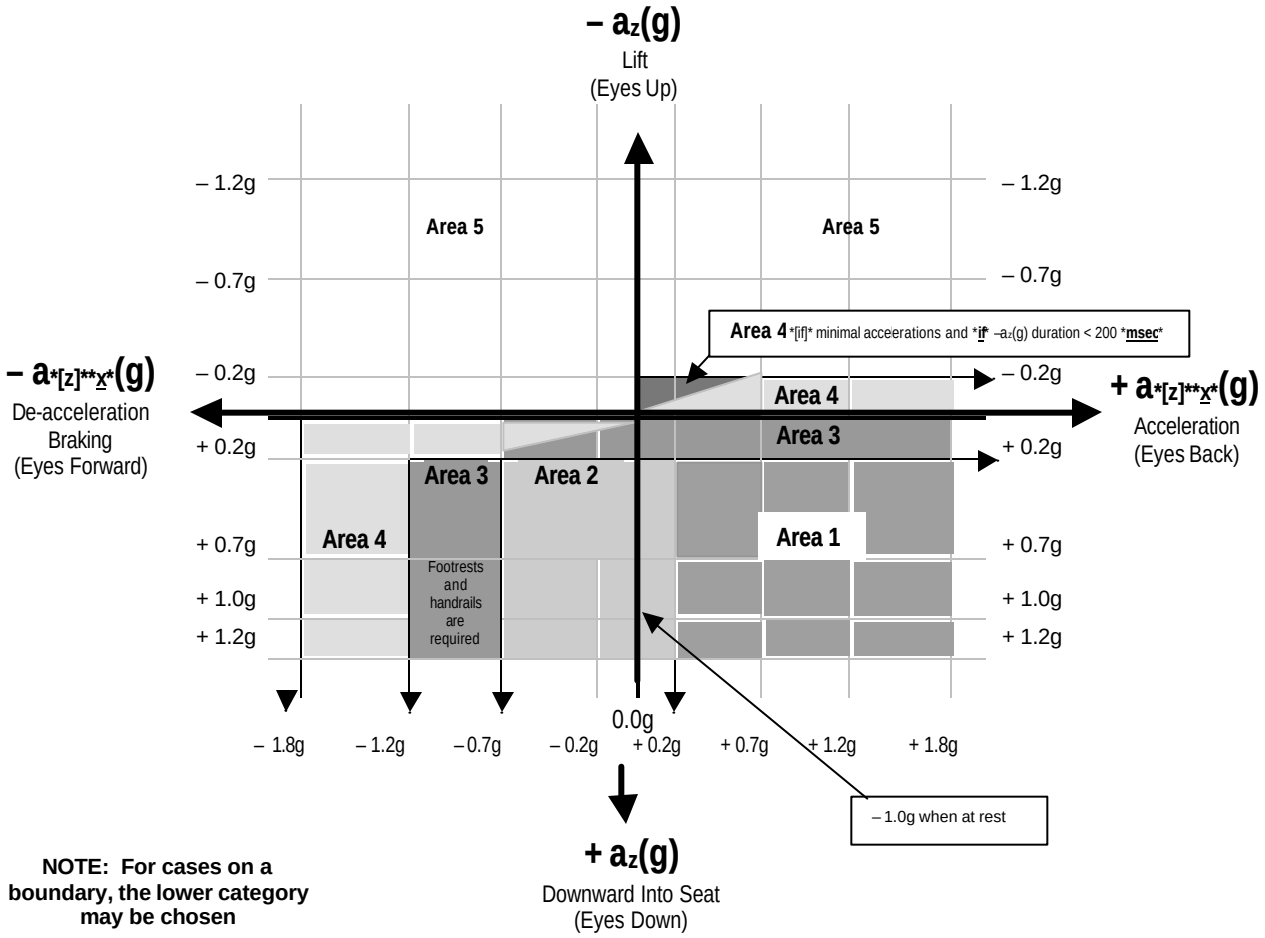
1. One of the following may be used as an alternative method of rider protection:

i. The ride dynamics shall be designed such that no impact or only light impact with the restraint takes place while still keeping the rider well restrained;

ii. Ride padding shall be designed to absorb impact load; or

iii. Another means acceptable to the Department shall be used.

Figure 2
Restraint Determination Diagram – Accelerations in Design Stage
Distinctive Areas 1 thru 5



(k) Restraint Criteria: Referring to areas on the Restraint Diagram shown in Figure 2 above, the following restraint classes shall be used:

1. Area 1: Based solely on the dynamic forces, no restraint is required.

i. Exception: A restraint shall be required if the Patron Restraint and Containment Analysis indicates that a restraint is necessary.

2. Area 2: A Class 2 restraint is required unless patrons are provided sufficient support and the means to react to the forces, for example, handrails, footrest or other devices. A Class 2 restraint device shall have at least the following:

i. Number of riders per restraint device: The restraint device may be for an individual patron or it may be a collective device for more than one patron;

ii. Final latching position relative to the rider: The final latching position may be fixed or variable in relation to the patron;

iii. Type of latching: The patron or operator may latch the restraint;

iv. Type of unlatching: The patron or operator may unlatch the restraint;

v. Type of latching indication: No indication is required;

vi. Means of activation: The restraint may be manually or automatically opened and closed; and

vii. Redundancy of latching device: A redundant design is not required.

3. Area 3: A Class 3 restraint is required. A Class 3 restraint device shall have at least the following:

i. Number of patrons per restraint device: The restraint device may be for an individual patron or a collective device for more than one patron;

ii. Final latching position relative to the rider: The final latching position must be adjustable in relation to the patron, for example, a bar or a rail with multiple latching positions;

iii. Type of latching: The restraint device may be manually or automatically latched. The manufacturer shall provide instructions that the operator shall verify the restraint device is latched;

iv. Type of unlatching: The patron may manually unlatch the restraint or the operator may manually or automatically unlatch the restraint;

v. Type of external correct or incorrect indication: No external indication is required other than a visual check of the restraint itself;

vi. Means of activation: The restraint may be manually opened and closed; and

vii. Redundancy of latching device: A redundant design is not required. The design shall be such that failure of the primary system is detected, automatically or manually, within one ride or device cycle.

4. Area 4: A Class 4 restraint is required. A Class 4 restraint device shall have at least the following:

i. Number of riders per device: A restraint device shall be provided for each Individual patron;

ii. Final latching position relative to the rider: The final latching position of the restraint must be adjustable in relation to the patrons, for example, a bar or a rail with multiple latching positions;

iii. Type of locking: The restraint device shall be automatically locked;

iv. Type of unlocking: Only the operator shall manually or automatically unlock the restraint;

v. Type of external correct or incorrect indication: No external indication is required other than a visual check of the restraint itself;

vi. Means of activation: The restraint may be opened or closed manually or with power; and

vii. Redundancy of locking device: Redundant design shall be provided for the locking device function.

5. Area 5: A Class 5 restraint is required. A Class 5 restraint shall have at least the following:

i. Number of riders per device: A restraint device shall be provided for each Individual patron;

ii. Final latching position relative to the rider: The final latching position of the restraint must be adjustable in relation to the patrons, for example, a bar or a rail with multiple latching positions;

iii. Type of locking: The restraint device shall be automatically locked;

iv. Type of unlocking: Only the operator shall manually or automatically unlock the restraint;

v. Type of external correct or incorrect indication: An external indication is required. Detecting the failure of either locking device shall either bring the ride to a cycle stop or inhibit cycle start;

vi. Means of activation: The restraint may be opened or closed manually or with power;

vii. Redundancy of locking device: Redundant locking devices are required; and

viii. Restraint configuration: Two restraints, for example, shoulder and lap bar, or one fail safe restraint device are required.

6. Secondary Restraints for Class 5: A Class 5 restraint configuration may be achieved by the use of two independent restraints or one fail-safe restraint. When two independent restraints are used, the secondary restraint device shall have the following minimum characteristics:

i. Number of riders per device: The restraint device may be for an individual patron or a collective device for more than one patron;

ii. Final latching position relative to the rider: The final latching position may be fixed or variable in relation to the patron;

iii. Type of locking: Only the operator may manually or automatically lock the restraint;

iv. Type of unlocking: Only the operator only shall manually or automatically unlock the restraint;

v. Type of external correct or incorrect indication: No external indication is required other than a visual check of the restraint itself;

vi. Means of Activation: The restraint may be opened or closed manually or with power; and

vii. Redundancy of locking device: The actuation means of the locking device shall be redundant.

5:14A-7.4 Patron clearance envelope design criteria

(a) Amusement rides and devices shall be designed to provide a patron clearance envelope adequate to minimize the opportunity for contact between the patron and other objects where said contact is likely to cause injury.

(b) The shape and size of the required clearance envelope shall be based on the appropriate patron model and the design of the patron containment system, if any. The minimum patron model shall be based on Dreyfuss Human Scale 4/5/6, 7/8/9 or SAE J833, or CDC 95th percentile with an additional (extended) arm and leg reach of three inches (effectively a 99.9th percentile) male, adult or child, as appropriate. The following shall be considered:

1. The intended patron size and height and any specified restriction for minimum or maximum patron height;

2. The shape(s) and configuration of the patron containment system including:

i. Seats, armrest, seat back and sides, foot well or other.

ii. Associated restraint system(s), if provided, for example, lap bar, seat belt, shoulder restraint, cage, or other; and

iii. The ability, as limited by the patron containment, of the rider to extend any part of their body, for example, arms and legs outward beyond the perimeters of the vehicle;

3. The physical nature of surrounding objects or surfaces that might otherwise be contacted, for example sharp, hard, rough or abrasive, ability to snag or trap and hold, or other attributes that may produce undesirable contact for the riders of the ride or device;

4. The relative speeds and directions that contact might take place;

5. The reasonably foreseeable changes that are likely to occur in the location or nature of the surroundings, for example, other adjacent moving vehicles or objects and their physical nature and speeds; and

6. The possibility of variations in the position or orientation of the patron carrying device (for example, angular movement, side movement, unrestrained or undampened motion or free swinging).

(c) The Patron Clearance Envelope Analysis shall be in accordance with N.J.A.C. 5:14A-7.4. These formats and the following definitions may be used as a guideline for determining minimum patron clearance envelope for amusement rides and devices:

1. The reach distance shall be the maximum reach limited only by the vehicle and seat geometry and restraint system. The possibility of a patron extending arms or legs through vehicle openings or beyond the reasonably foreseeable reach shall be considered. The Ride Analysis performed in accordance with N.J.A.C. 5:14A-7.2 may modify these requirements.

2. Where the design of an amusement ride or device allows contact within the clearance envelope between patrons and surrounding surfaces or objects, the manufacturer shall take reasonably appropriate measures to ensure that those surfaces or objects are configured to avoid hostile features such as splinters, sharp or sharply angled features or edges, protruding items, pinch points or entrapment areas. This requirement is especially important in a ride or device load/unload area where patron control and assistance devices are provided.

3. When the design of an amusement ride or device allows patron-to-patron contact, appropriate steps shall be taken to ensure that the potential contact is appropriate for the amusement ride's or device's intended use and the intended patron experience. Patron safety shall be addressed as dictated by the Ride Analysis.

(d) The design shall specify a means by which direct measurement may be taken to confirm that the intended patron clearance envelope is attained in the completed amusement ride or device assembled in its operating location.

1. The specified means shall include points from which measurements shall be taken. The locations of these points shall be illustrated with appropriate drawings in the manufacturer provided instructions or they may be physical markers on the amusement ride or device.

2. The determined means and clearance distances shall be shown in a convenient form and illustrated both graphically and numerically. Illustrations similar to Figures 3 and 4 below are one acceptable method.

Figure 3
Sample Rider Clearance Envelope – Front View

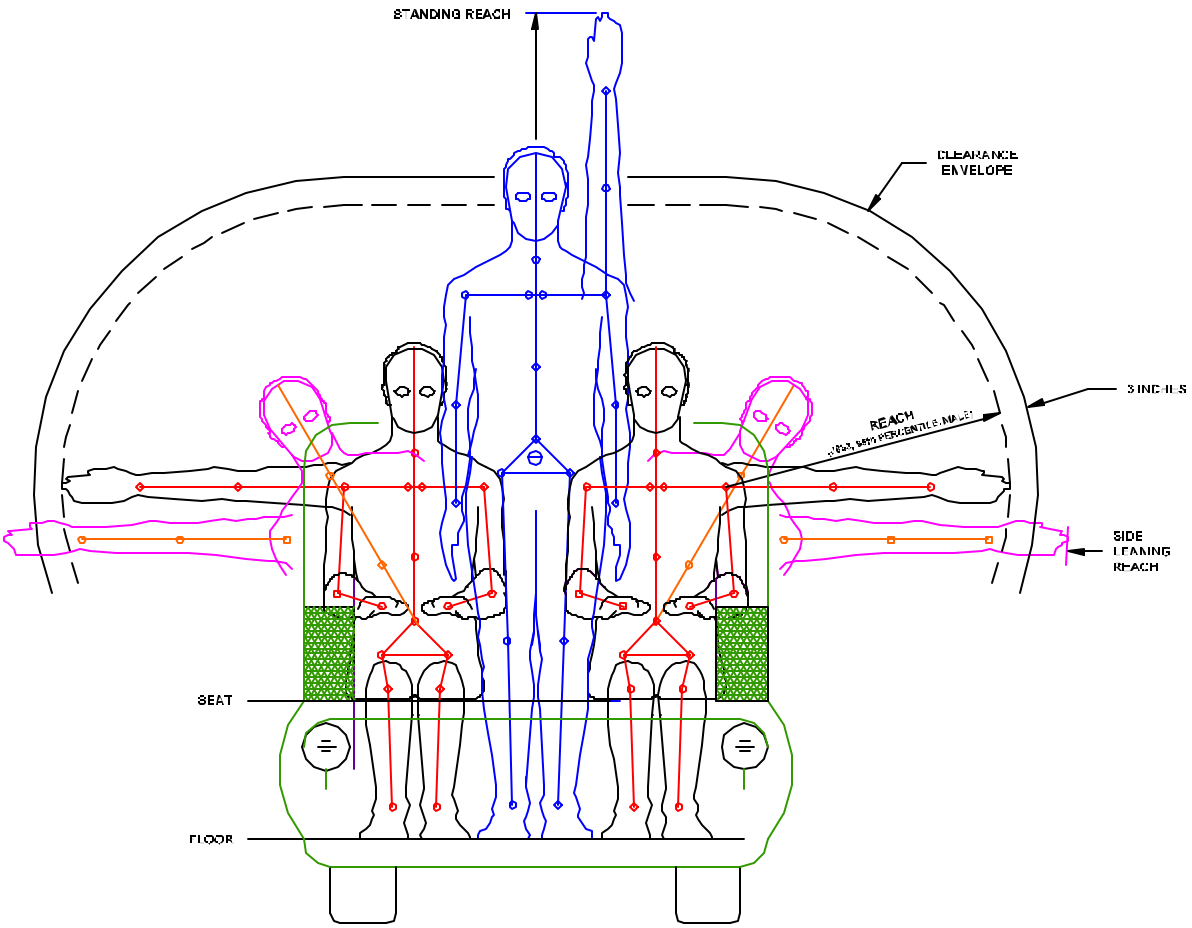
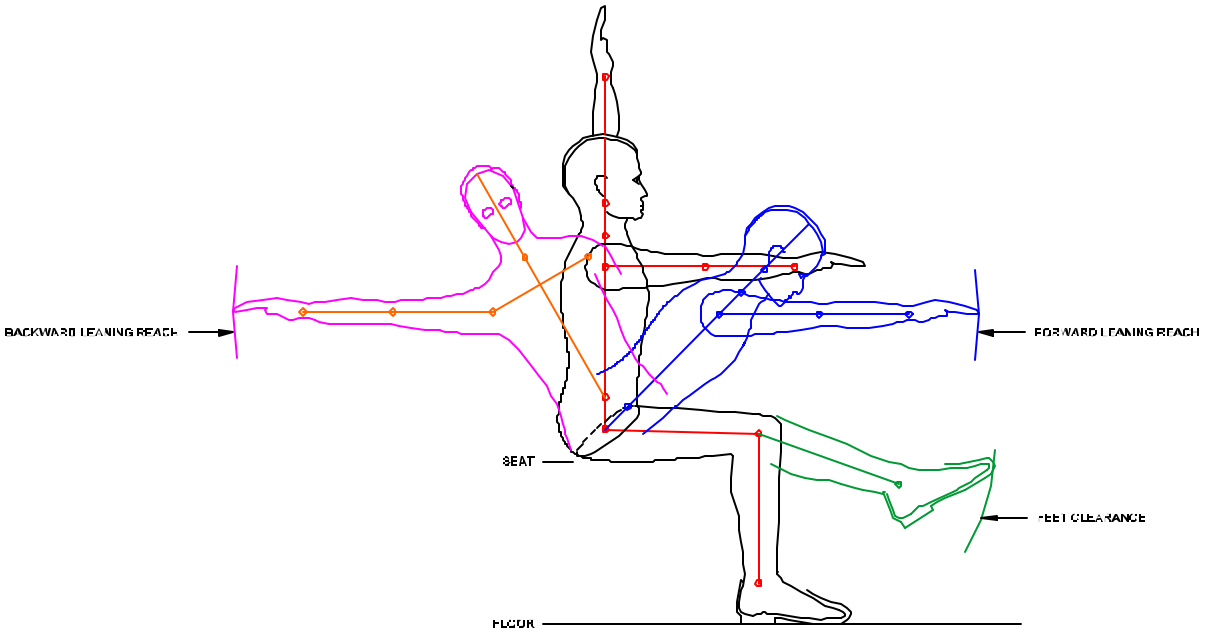


Figure 4
Sample Rider Clearance Envelope – Side View



(e) Any moveable system or device designed to encroach on the clearance envelope, that is, loading/unloading platforms, decks or other devices, shall be designed in a failsafe manner in order to prevent undesirable contact.
(f) The design shall include advisory signs or warning signs based on the attributes of the amusement ride or device. The recommendations included with the design shall be clear and concise, but are not intended to be the final wording of the signs that may be generated and displayed at the ride or device.
(g) Secondary safety devices such as latching belts, straps or other devices that limit the travel of a primary restraint device are acceptable.

5:14A-7.5 Acceleration limits
(a) Amusement rides and devices shall be designed such that the accelerations are within the limits specified in this subchapter. Any ride submitted for type certification/amended type certification or individual approval/supplemental modification certification with g's in excess of 75 percent of the limits of this subchapter shall be tested in accordance with ASTM F 2137-01. Any ride that has peaks greater than 75 percent of any value in the pulse width of less than 60 seconds in Figures 5 through 9 below, no matter how long its total run time, requires a Department-witnessed accelerometer test at the time of the acceptance inspection. For a carnival ride, this test may be performed at the factory by a third party testing agency.
(b) Amusement rides and devices or modifications that are designed to operate outside the acceleration limits herein shall include justification in the Ride Analysis. The justification shall include a review by a biodynamic expert.
(c) Acceleration can vary greatly depending on the type and design of the amusement ride or device and the effect of these accelerations is dependent on many factors that may be considered in

the design. Accelerations shall be coordinated with the intended physical orientation of the patron during the operating cycle. Rides and devices with patron containment systems shall be designed such that the patron is suitably contained and positioned to accept these accelerations. The Patron Restraint and Containment Analysis shall consider cases related to patron position within the restraint as determined by the Ride Analysis. Figure 1 in N.J.A.C. 5:14A-7.2 illustrates the coordinate system utilized.

1. For roller coasters, the maximum pitch, roll, and yaw design acceleration rates on the rider are (1 rev/sec^2) or (2? r/sec^2). Higher values may be used if demonstrated to be safe in the Ride Analysis. These are not to be used to exceed maximum acceleration rates from Figures 5 through 9 below.

(d) Sustained acceleration limits are shown in Figures 5, 6, 7, 8 and 9 below. The following definitions apply:

1. Acceleration units are "g's" (32.2 ft/sec/sec or 9.81 m/sec/sec).

2. The limits are based on low pass filtered data with a cutoff frequency of five Hz. The filter to be applied shall be either a 2 pole Butterworth applied in both the forward and reverse directions, or a 4 pole Butterworth applied in the forward direction conforming to SAE J 211. Cutoff frequency is defined to be that frequency where the magnitude response of the filter is the square root of 1/2.

3. Impacts are not addressed by this section.

4. Acceleration limits herein are for patrons 48 inches in height and above. The Ride Analysis shall determine whether more restrictive limits are appropriate for an amusement ride or device that accommodates patrons under 48 inches in height. This determination shall consider biodynamic effects on the patrons.

5. The coordinates and measurement point for the acceleration limits are in accordance with ASTM F 2137-01 Section 12 "Standardized Amusement Ride Characterization Test" (SARC Test).

6. The limits specified for all axes are for total net acceleration, inclusive of earth's gravity. A motionless body would therefore have a magnitude of one g measured in the axis perpendicular to the earth's surface, and a zero g magnitude in the axes parallel to the earth's surface.

7. Steady state values in the charts are not limited in time unless otherwise specified. Sustained exposure shall not exceed 90 seconds in a single event.

i. Sustained exposure in +Gz shall not exceed 40 seconds in a single event.

8. The Patron Restraint and Containment Analysis shall be used to determine the type of restraint. The type and performance of the restraint system selected may require a reduction in the acceleration limit. These limits are provided for the following basic restraints types:

i. Base Case (Class 4 or 5 Restraint): For the purpose of acceleration limits the class 4 restraint used as the base case herein also provides support to the lower body in all directions and maintains patron contact with the seat at all times.

ii. Over-the-Shoulder (Class 5 Restraint)

iii. Prone Restraint: A prone restraint is one in which the patron is oriented face down at a point or points during the ride cycle. A prone restraint is a restraint designed to allow the patron to accept higher acceleration in the –Gx (eyes front) as compared to the Base Case and Over-the-Shoulder restraints.

Figure 5
Time Duration Limits for +Gx (Eyes Back)

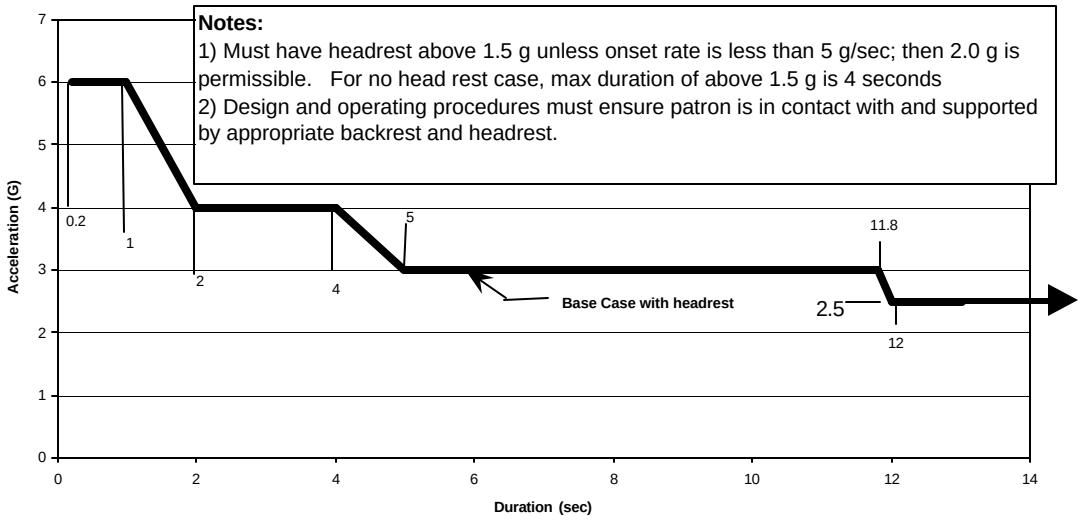


Figure 6
Time Duration Limits for -Gx (Eyes Front)

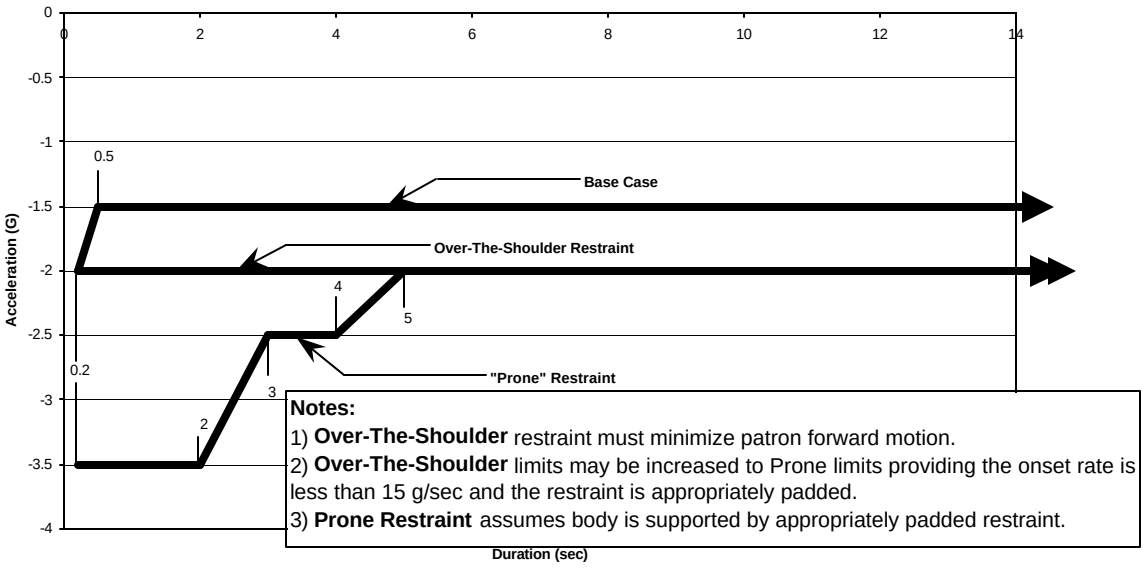


Figure 7
Time Duration Limits for +/-Gy (Eyes Left or Eyes Right)

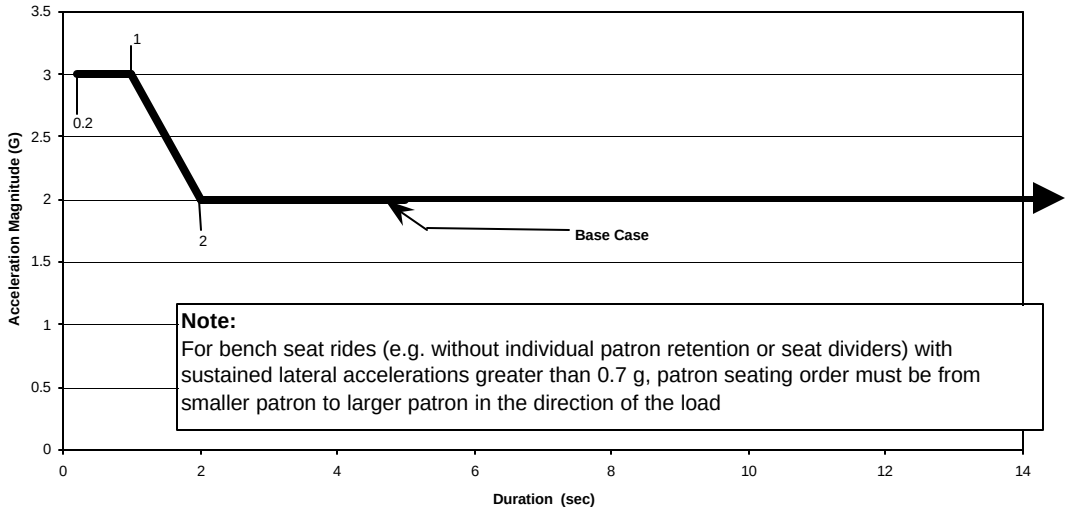


Figure 8
Time Duration Limits for -Gz (Eyes Up)

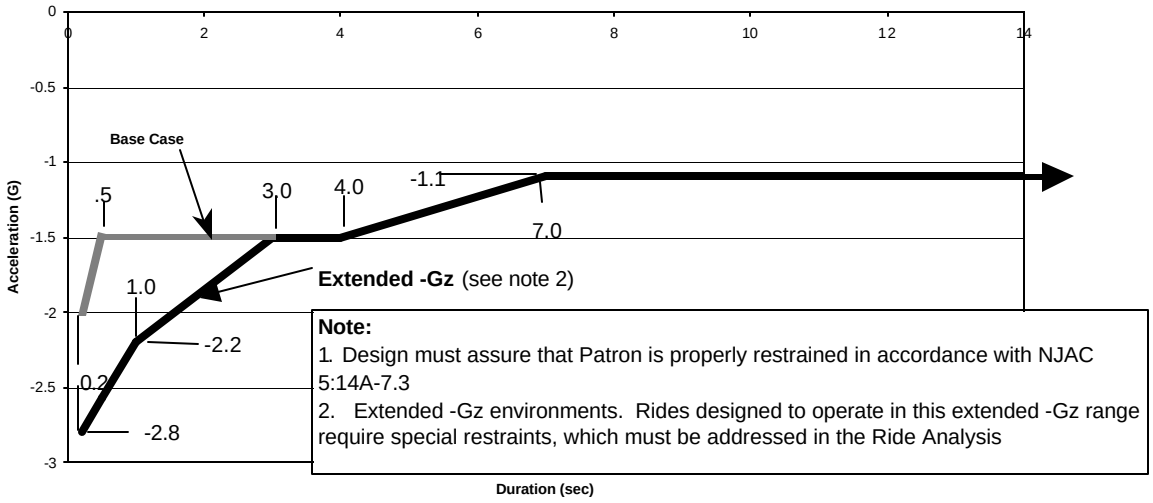
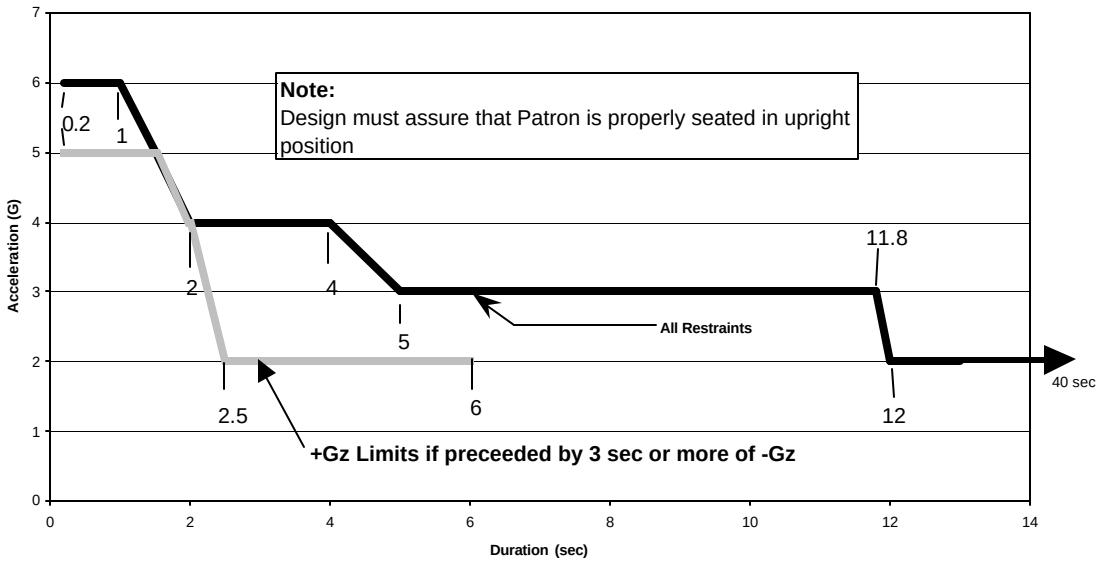


Figure 9
Time Duration Limits for +Gz (Eyes Down)

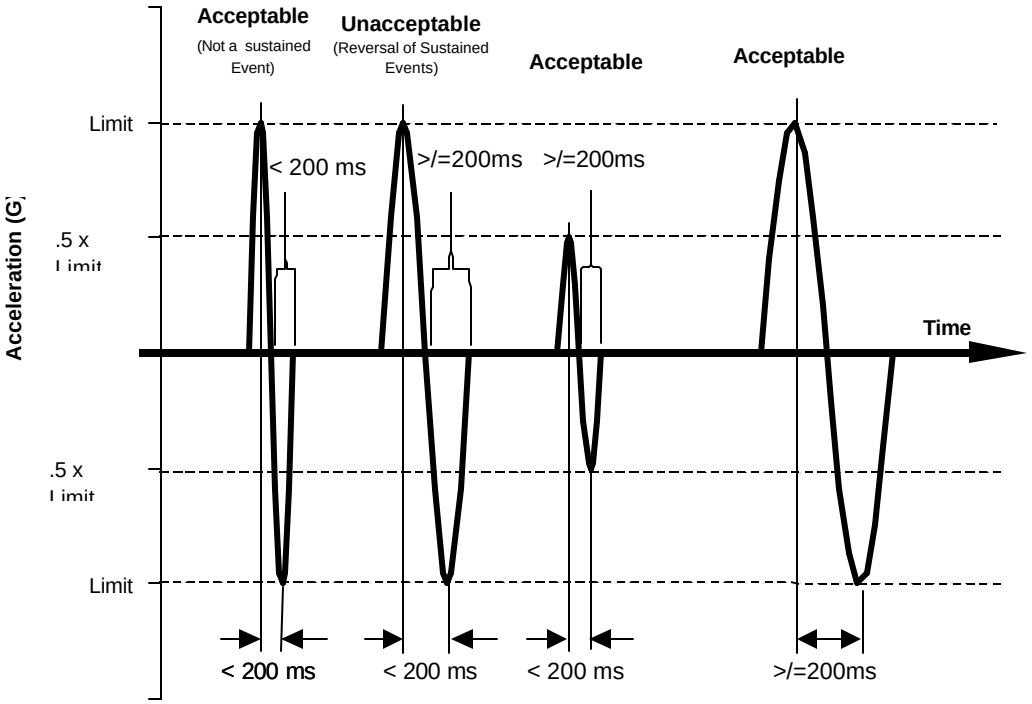


(e) Simultaneous combinations of single axis accelerations shall be limited as follows:
1. The instantaneous combined acceleration magnitude of any two axes shall be limited by a curve that is defined in each quadrant by an ellipse. The ellipse is centered at (0,0) and is characterized by major and minor radii equal to the allowable 200 millisecond (msec) g limits x 1.1. Graphical illustrations of this requirement are presented in Figure 10 below. (Note: For a given ride, only three of the illustrations will apply.)
(f) Reversals in X and Y accelerations are shown in Figure 10. The following criteria shall apply:

1. The peak-to-peak transition time between consecutive sustained events in X and Y accelerations shall be greater than 200 msec, as measured by the time between the peaks of the consecutive events. When the duration between consecutive sustained events is less than 200 milliseconds, the limit for the peak values shall be reduced by 50 percent.

2. The following examples illustrate such reversals (Figure 10):

Figure 10
Reversals in X and Y (5 Hz Filtered Data)

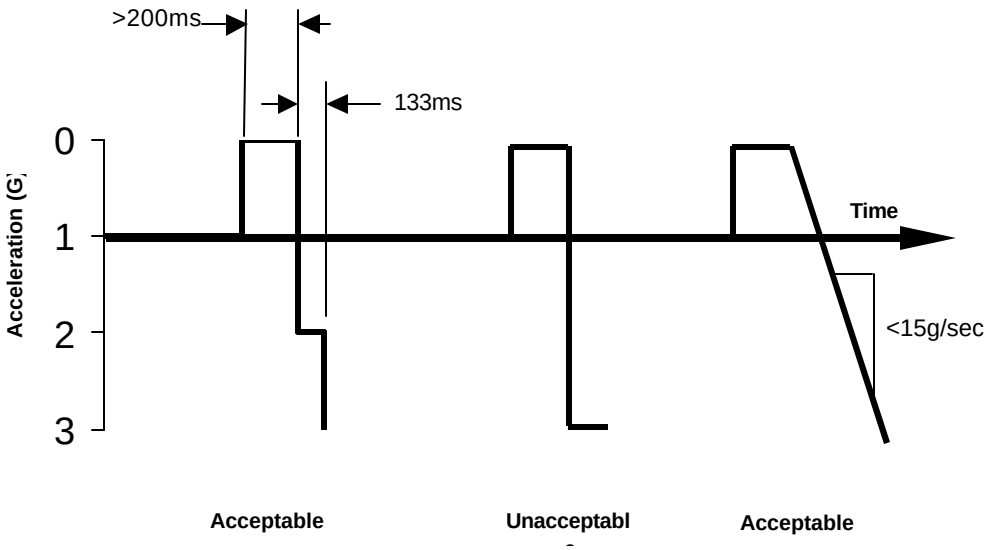


(g) Transitions in Z

1. Transition directly from negative (eyes up) limits to positive (eyes down) limits is restricted. If patrons are exposed to a negative Gz environment for more than three seconds, then the limits are reduced as shown in the +Gz limit chart for six seconds after the transition to positive Gz. After the six-second period, the limits may be increased to the normal chart levels.

2. Other transitions in Z accelerations are shown in Figure 11 below. The following criteria shall apply: When transitioning from sustained weightless (0G) and more negative levels to two g and more positive levels, the effective onset of positive g's shall be less than 15 g/sec. Figure 11 below illustrates such transitions.

Figure 11
Transitions From Sustained -Gz (eyes up) to +Gz (Eyes Down) (5 Hz Filtered Data)



(h) Measurement and analysis of acceleration on amusement rides and devices shall be performed in accordance with ASTM F 2137-01, "Measuring the Dynamic Characteristics of Amusement Rides and Devices." The design acceleration levels of the final operational assembly of a newly developed amusement ride, device, or modification shall be verified at commissioning. The manufacturer may verify acceleration limits herein by using either manual or automatic procedures.

(i) Illustrations for simultaneous acceleration combinations between axes follow:

Illustration 1 of 8

Allowable Combined Magnitude of X and Y Accelerations

X Axis: Base/OTS Limit
Y Axis: Base Limit

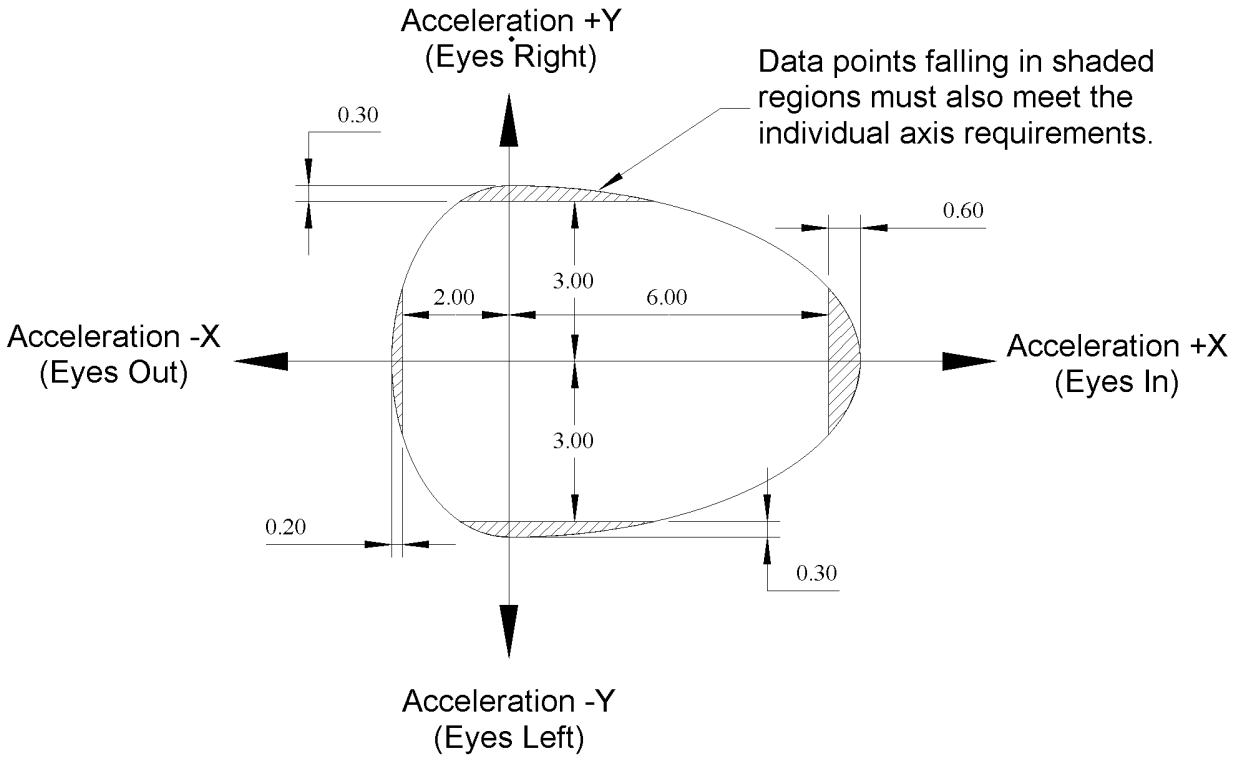


Illustration 2 of 8

Allowable Combined Magnitude of X and Z Accelerations

X Axis: Base/OTS Limit
Z Axis: Base Limit

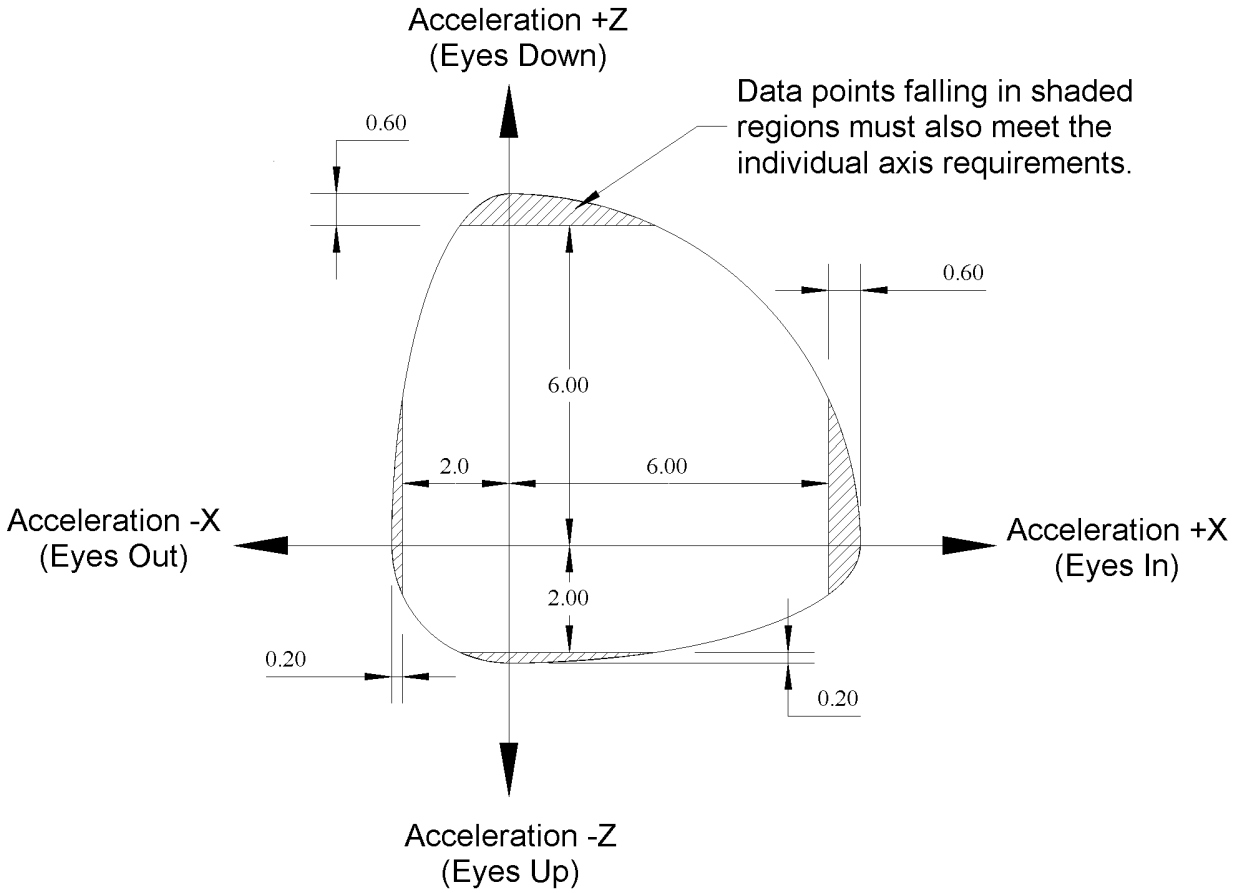


Illustration 3 of 8

Allowable Combined Magnitude of X and Z Accelerations

X Axis: Base/OTS Limit
Z Axis: Extended Limit

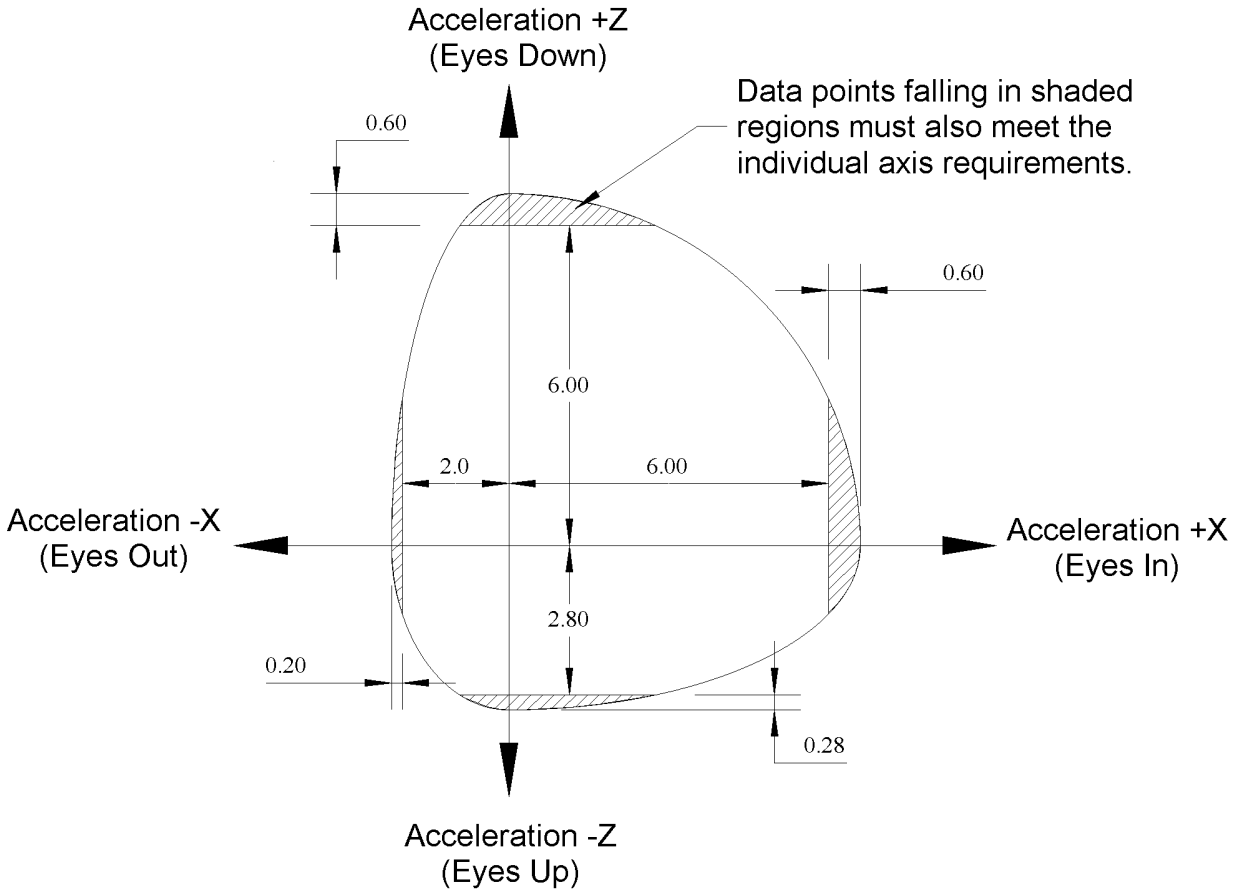


Illustration 4 of 8

Allowable Combined Magnitude of X and Y Accelerations

X Axis: Prone Limit
Y Axis: Base Limit

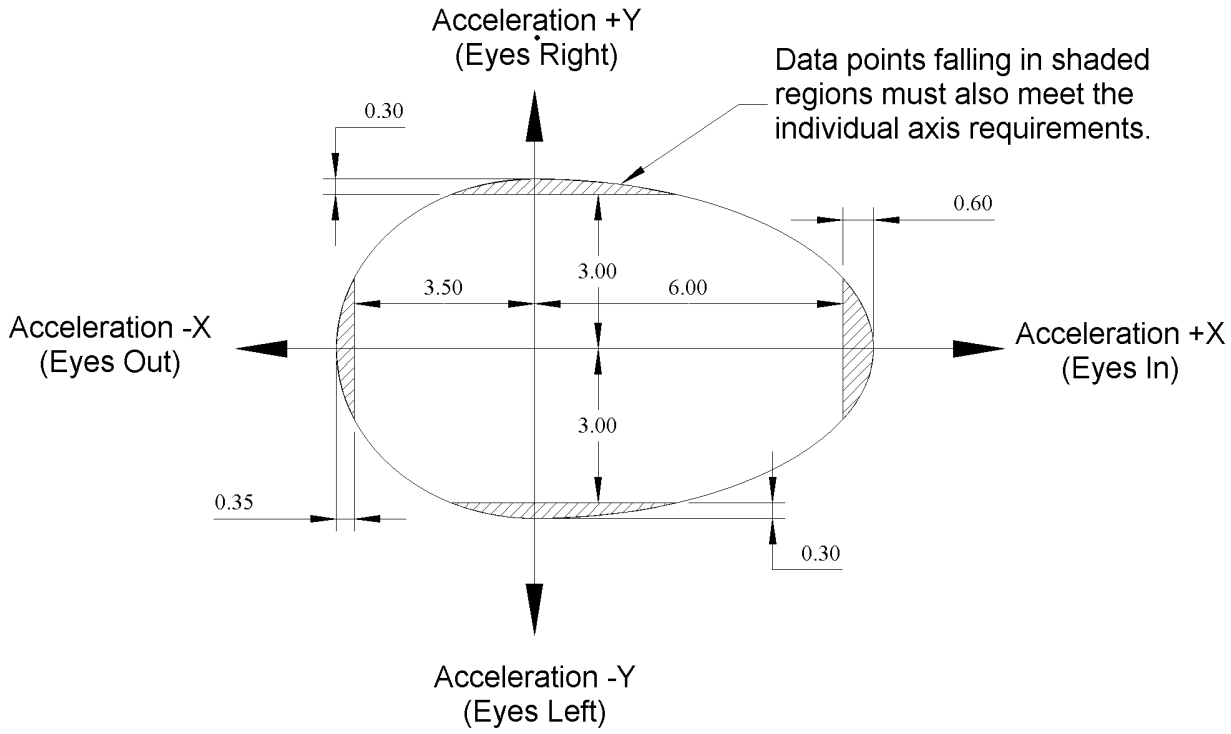


Illustration 5 of 8

Allowable Combined Magnitude of X and Z Accelerations

X Axis: Prone Limit
Z Axis: Base Limit

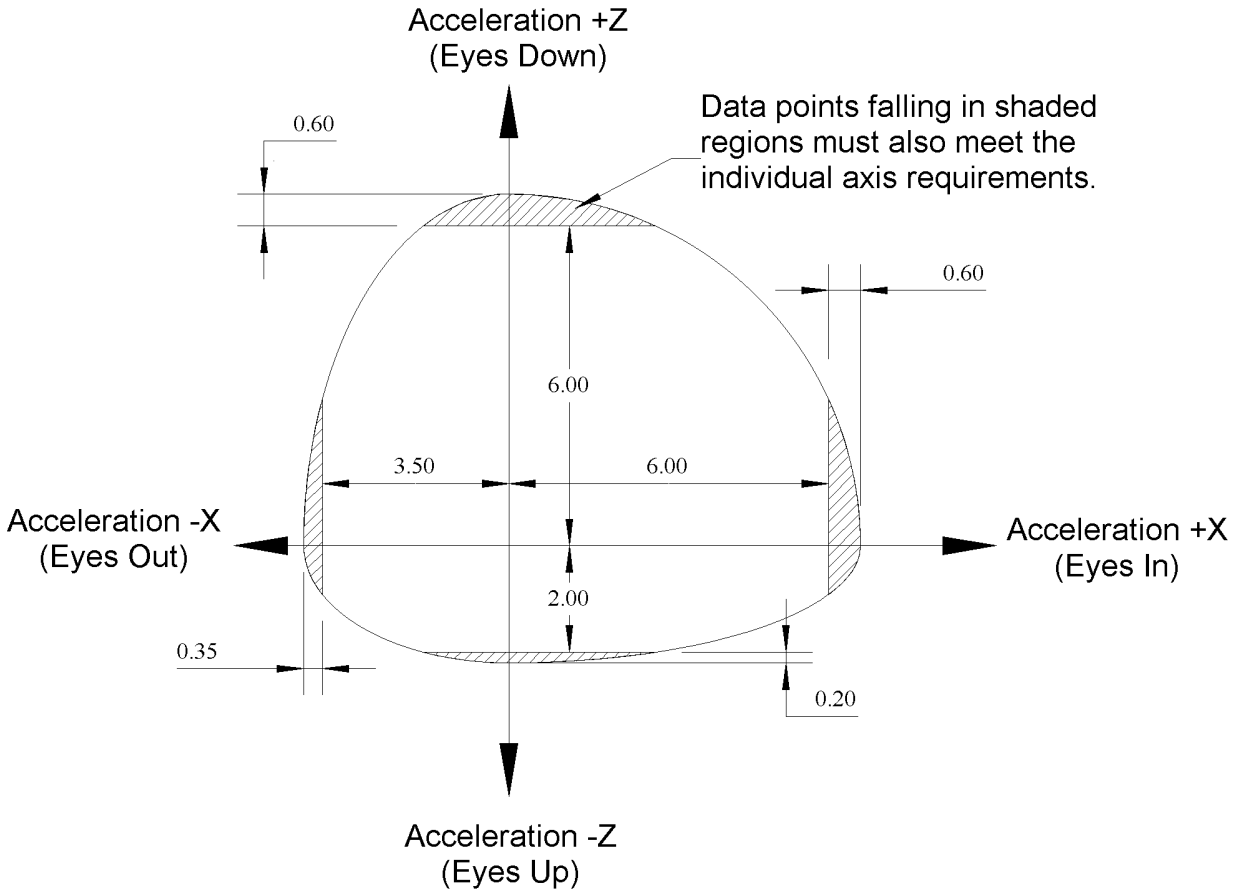


Illustration 6 of 8

Allowable Combined Magnitude of X and Z Accelerations

X Axis: Prone Limit
Z Axis: Extended Limit

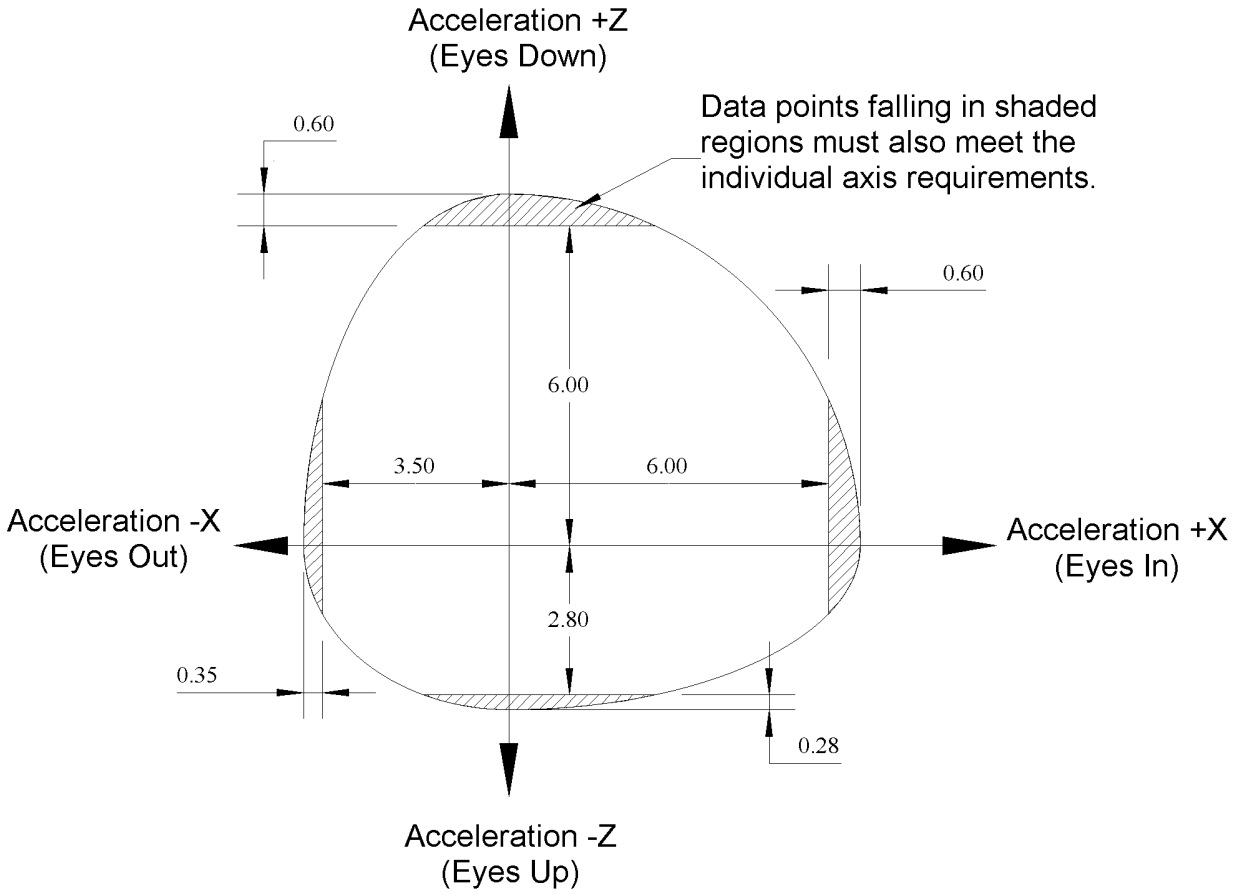


Illustration 7 of 8

Allowable Combined Magnitude of Y and Z Accelerations

Y Axis: Base Limit
Z Axis: Base Limit

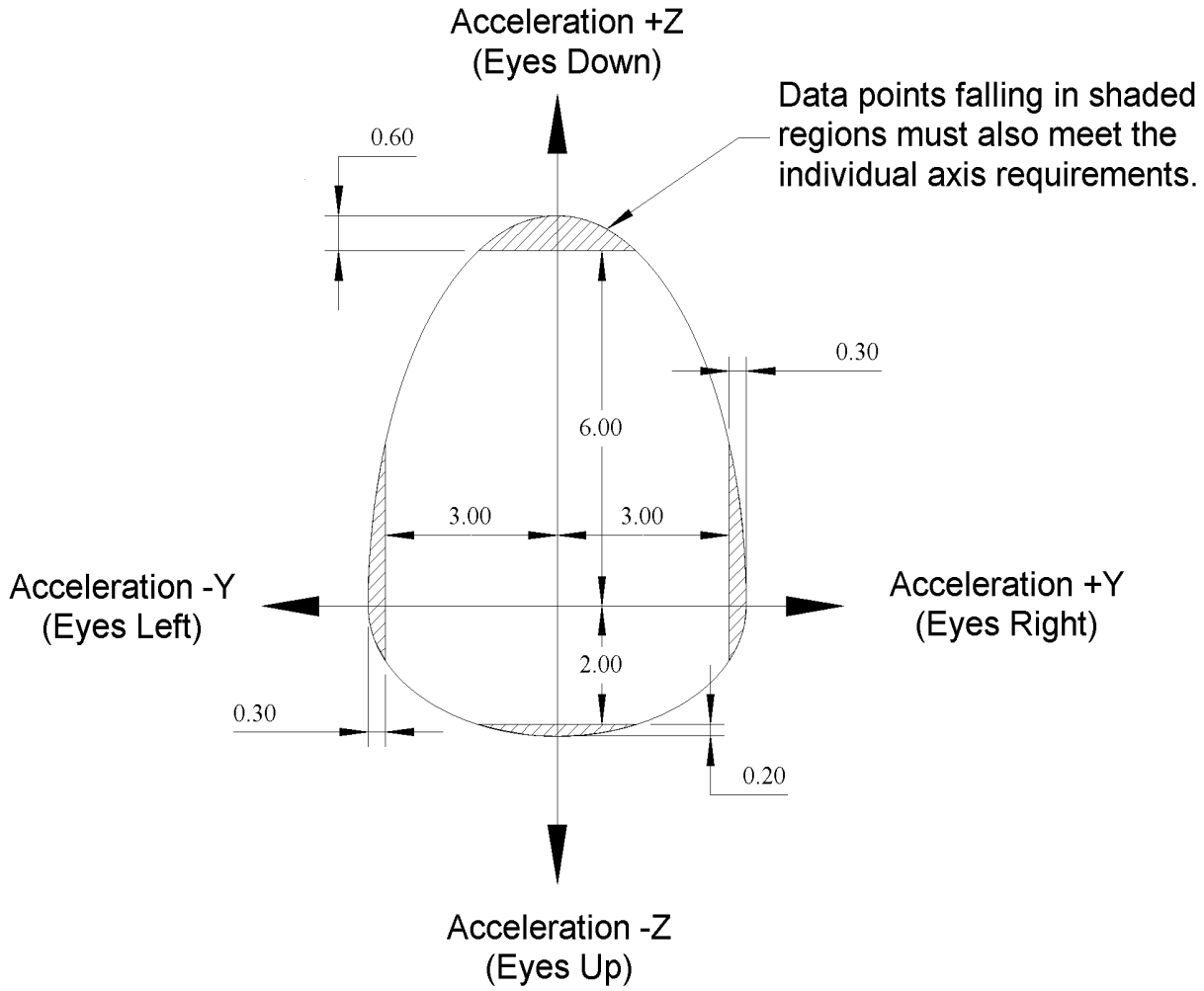
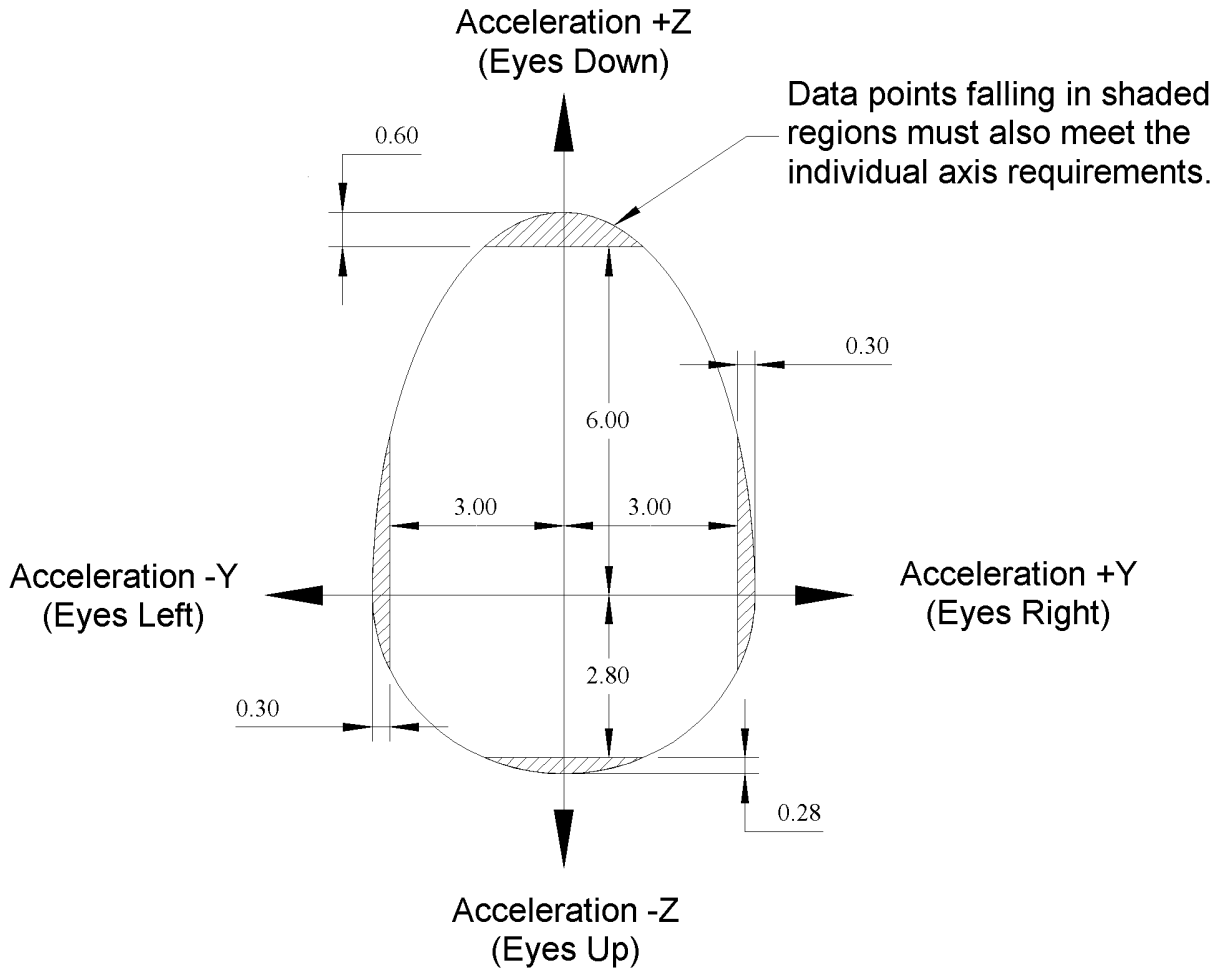


Illustration 8 of 8

Allowable Combined Magnitude of Y and Z Accelerations

Y Axis: Base Limit
Z Axis: Extended Limit



5:14A-7.6 Loads and strengths

(a) Overview:

1. The entire loads and strengths section defines the criteria that shall be applied in the process of design for amusement rides and devices and in the process of design for modifications made to amusement rides and devices. These criteria are specifically intended for use in determining the loads and strengths of materials, and performing the calculations and analyses used in the process of design.

2. The intent of the loads and strengths section is to broadly define the criteria for minimum design requirements to be required in the design of the amusement ride or device. These criteria are specifically intended for use in determining the loads and strengths of materials, and performing the calculations and analyses used in the process of design.

3. The loads and strengths section contains both flexible and finite criteria. These criteria are flexible in allowing the type(s) of calculation or analyses to be used in the design. These criteria are finite with respect to how the inputs and outputs to the overall analysis and calculations shall be used in the design.

(b) General provisions:

1. Amusement rides and devices shall be designed so that load conditions expected during operation shall not cause failures during the operational hours used in the design per (c) and (d) below.

2. Amusement rides and devices shall be designed so that the expected loading conditions will not cause stresses to exceed the yield strength of the materials.

i. Exception: Seismic design may allow for the possibility of plastic deformation and may rely on connection ductility to absorb energy.

ii. Exception: Components and portions of structures that are intended to provide secondary load paths during a failure condition, including such components such as safety cables or links and certain limited portions of the primary structure to which they are attached, may be designed to yield (and thus absorb a significant amount of energy) when subjected to load conditions that might occur during a plausible, although unlikely, primary structure failure scenario. A design that relies on such criteria shall use materials that possess high elongation for components where stresses may be expected exceed the yield strength under failure mode loading conditions.

(c) 35,000 operational hour criteria:

1. All primary structures of an amusement ride or device (for example, track, columns, hubs and arms) shall be designed using calculations and analyses that are based on the minimum 35,000 operational hour criteria. The design shall demonstrate that the calculations and analyses meet or exceed this minimum operational hour requirement. This requirement is intended to ensure that all primary structures within an amusement ride or device are designed for at least a minimum fatigue life.

2. An "operational hour" is defined as an hour of time during the normal operation of the amusement ride or device. Normal operation includes start-up (that is, beginning of the operational day), operation, and shutdown (that is, end of the operational day). Those periods of time that the amusement ride or device is not being operated (that is, non-operating hours, seasonal park closures, or transit times for portable rides and devices) shall not be included in the operational hour calculations.

i. Calculations for the 35,000 operational hour criteria may include a general reduction to account for the load and unload time of the amusement ride or device. The value

selected for the reduction shall be based on the specific amusement ride or device and the design load and unload times. This reduction shall be limited to a maximum of 30 percent of the 35,000 operational hour criteria for the amusement ride or device. The amount of operational hours calculated after applying the general reduction for load and unload times will be the value used for the design calculations and analyses.

ii. The calculation to determine the general reduction for load and unload time shall be as follows:

$$\left(\frac{(\text{Total load/unload time for one ride cycle})}{(\text{Total load/unload time for one ride cycle}) + (\text{Time for one ride cycle})}\right) = \text{General reduction for load/unload time}$$

iii. The calculation to determine the operational hours to be used in the applicable design calculations and analyses for the amusement ride or device shall be as follows:

$$[(35\,000 \text{ Operational hours Criteria}) \times (1.00 - \text{general reduction for load/unload time})] = \text{Operational hours}$$

3. The design shall specify the ride cycle time and the load and unload time to be used in the calculations to determine the operational hours. These values are for design calculation and analysis purposes only and shall not be interpreted as operational requirements for the amusement ride or device.

4. Idle time (the time the ride is ready for operation, but is not being cycled) is not intended or required to be included in the calculations for the operational hours. After installation of the amusement ride or device, the actual idle time shall be recorded and documented and applied in the maintenance and inspection of the amusement ride or device.

5. Ride cycles differ greatly from load cycles. For applicable components, a calculation may need to be performed to determine the number of load cycles that occur within the total number of operational hours calculated and then used in the design calculations and analyses for the amusement ride or device.

6. The following examples of calculations illustrate how the general reduction for load and unload time and the number of operational hours, to be used in the design calculations and analyses for an amusement ride or device, can be determined.

i. Example 1:

For this example : The time for one ride cycle (not including load or unload time between ride cycles) = 4 minutes.
The load and unload time between ride cycles (not including ride cycle time) = 3 minutes

Calculating the general reduction allowed for load and unload time :

$$\left(\frac{\text{(Load/unload time for one ride cycle)}}{\text{(Load/unload time for one ride cycle)} + \text{(Time for one ride cycle)}}\right) = \text{General reduction for load/unload time}$$

$$\left(\frac{3\text{ minutes}}{(3\text{ minutes} + 4\text{ Minutes})}\right) = 0.428 \text{ or } 43 \text{ percent,}$$

0.428 or 43 percent is the calculated value for load/unload time for each operational hour.

Because (c)2.i.above limits the maximum reduction to 30 percent, the maximum reduction in this example is 30 percent.

Calculating the operational hours to be used in the design calculations and analyses:

$$[(35\,000 \text{ Operational Hour Criteria}) \text{x} (1.00 - \text{General reduction for load/unload time})] = \text{Operational hours for design}$$

$$[(35\,000 \text{ Operational Hour Criteria}) \text{ x } (1.00 - 0.30)] = 24\,500 \text{ Operational hours}$$

In this example, the designer would use 24,500 operational hours for all applicable design calculations and analyses.

ii. Example 2: The following example calculation illustrates how the total number of load cycles can be determined for a specific applicable component on an amusement ride or device.

For this example:

The previously calculated operational hours to be used in the design for applicable components = 24,500 operational hours.

The number of ride cycles per operational hour (including load and unload time between ride cycles) = 9 ride cycles.

The number of load cycles per ride cycle for this particular applicable component = 8 load cycles.

Calculation for determining the total number of load cycles for an applicable component:

$$\left(\frac{\text{Operational hours for design}}{1}\right) \text{x} \left(\frac{\text{Ride cycles}}{\text{Operational Hour}}\right) \text{x} \left(\frac{\text{Number of load cycles}}{\text{Ride cycle}}\right) = \text{Total number of Load Cycles}$$

$$\left(\frac{24\,500 \text{ operational hours}}{1}\right) \text{x} \left(\frac{9 \text{ ride cycles}}{1 \text{ operational hour}}\right) \text{x} \left(\frac{8 \text{ load cycles}}{1 \text{ ride cycle}}\right) = 1{,}764{,}000 \text{ load cycles}$$

In this example, the calculation shows that the applicable component will experience 1.76 x10^6 load cycles throughout the 24,500 operational hours.

(d) Exceptions to the 35,000 operational hour criteria:

1. A ride may be designed for more than the 35,000 operational hour criteria.

2. Specific components of an amusement ride or device structure may be excluded from the 35,000 operational hour criteria only when such components are replaced or inspected and re-evaluated as specified in the ride inspection and maintenance instructions. This exclusion applies only to components that are replaceable by disassembly and re-assembly (that is, attached with fasteners, for example, bushings, bearings, removable pins, axles, bogies, and inter-car connections, hydraulic pumps and electric motors), and does not include components that are permanently attached (that is, welded) to the primary structure. This requirement does not exclude the use of primary components connected to primary structure with fasteners or primary structure that is connected with fasteners.

i. The design shall identify and list all components of the primary structure excluded from the 35,000 operational hour criteria, including the criteria for replacement or inspection and re-evaluation, in the operating and maintenance instructions for the amusement ride or device.

ii. Specific components of an amusement ride or device structure designed to take advantage of this specific exception to the 35,000 operational hour criteria are not exempt from other criteria listed within this Subchapter.

(e) Operation beyond the 35,000 operational hour criteria:

1. No ride may operate beyond the life span of a ride as provided in this subchapter and as calculated by the manufacturer unless the ride has been reviewed by the design engineer or another licensed professional engineer and the ride has been determined to have remaining life. (In cases where such a review is undertaken by a licensed professional engineer who is not the design engineer, the design engineer shall be notified, where possible.)

i. To extend operation, the reviewing engineer shall perform an evaluation and inspection of the amusement ride and either prescribe appropriate inspection and testing at specified intervals, including a date when the ride is to be reevaluated for continued operation, or calculate a new, extended fatigue life or both.

(1) The engineer's review shall include a review of the operating or maintenance instructions and a list of any new or modified operating or maintenance procedures, in addition to inspection and testing, to be followed.

ii. Any new or modified operating or maintenance procedures, including any inspection and testing prescribed, shall be incorporated in the ride operating or maintenance instructions, or both, as may be appropriate. An amended type certification or an individual approval for the ride shall be required and the ride shall not be used or operated beyond the lifespan unless and until such amendment is approved by the Department.

(f) Patron Weights:

1. The weight assigned to an adult patron, for design purposes, shall be 170 pounds or 0.75 kN.

2. The weight assigned to a child patron, for design purposes, shall be 90 pounds or 0.40 kN.

3. As a fatigue case, amusement rides and devices designed for adult and child patrons shall be designed to operate during typical ride or device operating cycles with a full patron payload of 170 pounds or 0.75 kN located at all available seat positions.

4. As a fatigue case, amusement rides and devices designed for adult and child patrons shall be designed to operate during typical ride or device cycles with partial payloads (that is, worst case unbalanced load) of adult patrons.

5. As a fatigue case, amusement rides and devices designed for child patrons shall be designed to operate during typical ride or device operating cycles with a full patron payload of 90 pounds or 0.40 kN located at all available seat positions.

6. As a fatigue case, amusement rides and devices designed for child patrons shall be designed to operate during typical ride or device cycles with partial payloads (that is, worst case unbalanced load) of child patrons.

7. Any specific limitations to operating with partial or maximum payloads assumed by the load calculations (that is, certain kinds of eccentric loading not allowed during operation) shall be clearly specified in the operating restrictions within the operating and maintenance instructions.

8. As a non-fatigue, dynamic case, amusement rides and devices shall be designed for occasional full or partial payloads of large adult patrons weighing 300 pounds per seat or an appropriate lesser amount if patrons are limited by the size of the seat or restraint or both. This means that if an adult patron weighing 300 pounds cannot fit into an amusement ride or device due to limitations with the size of the seat or restraint or both, then the amusement ride or device does not have to be designed to accommodate for occasional full or partial payloads of large adult patrons weighing 300 pounds per seat. In this case, the amusement ride or device shall be designed to accommodate occasional full or partial payload of the heaviest adult patrons that the amusement ride or device can physically accommodate. For kiddie rides, this analysis shall be performed using 160 pounds per seat.

i. This requirement shall be for calculation purposes only and shall not be interpreted as a requirement for the operation of the amusement ride or device. In addition, this subsection shall apply only to deflection and permanent deformation load calculations.

(g) Loads:

1. All applicable loads the amusement ride or device may be subjected to shall be considered.

2. Load calculations shall be performed for all amusement rides and devices.

3. The appropriate empirical tests shall be performed as soon as practical on the amusement ride or device (for example, weigh ride vehicles, measure acceleration and deceleration) to verify that the design assumptions used and weights and loads calculated are in accordance with the empirically measured values.

4. For portable rides, an evaluation shall be done in the trailering position and steps shall be taken to provide a bracing system that unloads the ride structure and protects it from fatigue and overload conditions.

(h) Permanent loads:

1. Permanent loads (that is, dead loads) for an amusement ride or device include all loads that do not fluctuate with respect to time during operation of the amusement ride or device. Dead loads shall include the load bearing structure, accessories, and the technical equipment required for operation, including claddings, fabrics, and decoration. The following shall each be considered a part of the overall permanent load:

i. The weight of the equipment;

ii. Conduits and piping;

iii. Ballast;

iv. Cladding;

v. Hard and soft themed and decorative coverings;

vi. Cables;

vii. Water (non-ponding);

viii. Entrained fluids (water, hydraulic oil); and

ix. Show elements mounted to ride.

2. Special types of permanent loads that (dead loads) do fluctuate with respect to time, but the fluctuations happen very slowly and occur only a limited number of times. Examples of these loads include

i. Foundation settlement (refer to ASCE 7);

ii. Misalignment;

iii. Deliberate pre-loading of structural components;

iv. Active and passive earth pressures;

v. Structural interaction at interfaces between the ride and track structure and the facility structure; and

vi. Maintenance loads (that is, fluctuations produced by draining of entrained fluids for maintenance)

3. The lists provided in (h)1. and 2. above are not intended to be a comprehensive or exhaustive list of loads. They are provided for consideration in the design process. The design shall include an evaluation of the loads the amusement ride or device is expected to experience during the calculated operational hours.

4. To the maximum extent practical, the applicable interfaces or mounts between facility structures and track structures or support structures and machinery shall be designed to reduce or eliminate the stresses caused by misalignment.

(i) Variable loads: Variable loads (that is, live load) for an amusement ride or device include all loads that fluctuate with respect to time. Variable loads are divided into four subsets: operational loads, non-operational loads, environmental loads, and operation in wind, which are addressed in (j) through (m) below.

(j) Operational (dynamic) loads:

1. Operational loads include varying loads normally encountered during operation of the amusement ride or device.

2. Both high (number of) cycle and low (number of) cycle dynamic loads shall be considered.

3. Elevated walking surfaces, including, but not limited to, waiting areas, loading and unloading areas, platforms, landings, stairs, and ramps, shall be designed to accommodate a live load of at least 100 pounds per square foot.

4. Operational loads shall include:

i. High cycle;

(1) Drive/actuation forces;

(2) Moving loads;

(3) Braking forces;

(4) Operational dynamics/vibration;

(5) Kinematic induced loads;

(6) Hydrostatic/hydrodynamic;

(7) Unbalanced load (centrifugal);

(8) Misalignment (that is, rotating shafts);

(9) Aerodynamic;

(10) Movement of show elements mounted to ride vehicle; and

(11) Patron restraint – adult patron (both inertial and direct force).

ii. Low cycle;

(1) Emergency evacuation;

(2) Runaway condition (that is, loads generated when drives/actuators operate at their full rated capacities);

(3) Patron restraint, large adult patrons;

(4) Fuel consumption;

(5) Earthquake;

(A) This subchapter does not require portable amusement rides and devices to be designed for seismic loads. However, when a portable amusement ride or device is designed for seismic loads, a description of these loads will be stated in the strength calculations, and included in the operating and maintenance instructions.

(6) Collision with emergency end stops; and

(7) Shock due to failure of redundant component (that is, cable suspended ride with dual cables);

iii. Low or high cycle;

(1) Reverse operation;

(2) Emergency stops;

(3) Anti-rollback;

(4) Patron load/unload forces;

(5) Possible failure modes producing loads on secondary structure (that is, safety cables and links, etc.); and

(6) Loads generated by special testing requirements (for example, increased weight, velocity or acceleration during cycle testing).

5. Because patron restraint loads occur in several ways, each of the following conditions shall be considered in the design of an amusement ride or device:

i. Accelerations acting on the mass of the patrons produce inertia loads that are reacted by the restraint systems in order to hold the patrons in place during movement of the ride vehicle;

ii. Unintentionally or intentionally, patrons may apply significant forces to the restraints at times and during events not necessarily associated with inertia loading caused by motion of the ride. Examples are forces applied during loading and unloading of a ride vehicle when patrons grab onto restraints for balance or to pull themselves into and out of the ride;

iii. Patrons may pull or push on restraints while the restraint system is locked in either the up or down position in an attempt to move the restraint into or out of the restrained or unrestrained position (that is, prior to the operator engaging or releasing the restrain system); and

iv. Patrons may attempt to intentionally damage a restraint system by applying their full strength to the restraint system and the design should possess sufficient strength to preclude yielding or undergoing significant deformation or both under this loading condition. In cases where more than one patron is restrained by a particular system, the design shall consider that all patrons will apply the same excessive (that is, abusive) forces.

(k) Non-operational loads: All non-operational loads, those associated with transportation or handling or both (that is, setting up, tearing down) and ongoing maintenance of portable and permanent amusement rides or devices, shall be considered in the design analysis.

(l) Environmental loads:

1. Portable amusement rides and devices shall be designed to resist all environmental loads that can be reasonably anticipated.

2. Fixed or permanent amusement rides and devices shall be designed to resist all applicable environmental loads for the intended location in accordance with the environmental loads in the applicable building codes for the intended location.

i. Each type certified ride shall comply with (l)2 above or shall be designed for the worst case environmental conditions in New Jersey.

3. The operating and maintenance instructions shall clearly indicate the environmental loads for which the amusement ride or device was designed. In addition to the environmental load information, any restrictions, limitations, or special procedures associated with amusement rides exposed to these environmental loads shall be included.

4. Environmental loads to consider in the design include:

i. Snow and ice;

ii. Rainwater and ponding accumulation;

iii. Earthquake (seismic);

(1) This subchapter does not require portable amusement rides and devices to be designed for seismic loads. However, when a portable amusement ride or device is designed for seismic loads, a description of these loads will be stated in the strength calculations, and included in the operating and maintenance instructions.

iv. Wind (operational and non-operational); and

v. Self-straining – changes in temperature, time variant ground forces (for example, settling).

(m) Operation in wind:

1. As a minimum, amusement rides and devices exposed to wind shall be designed to operate in winds up to 34 miles per hour (15 meters per second). Rides that are not designed to operate at this wind load shall have their design limitations clearly stated in the manual with instructions regarding any necessary disassembly of the ride.

2. Overturning calculations and load and strength calculations, as necessary, shall be required for operational wind loads.

3. The operating and maintenance instructions shall include the conditions for operation in wind for which the ride was designed. In addition to the operating information, any design restrictions, limitations, or special procedures for the safe operation of an amusement ride or device exposed to wind shall be included.

(n) Non-operational in wind:

1. Overturning calculations and load and strength calculations shall be required for non-operational wind load.

2. In addition to the operating and maintenance instructions requirements in (m)4 above, any design restrictions, limitations or special procedures for non-operating or out-of-service amusement rides and devices, and their associated components exposed to wind shall be included in the operating and maintenance manual.

(o) Design:

1. To verify that there is adequate structural capability in the design, a structural analysis shall be provided for each amusement ride or device. Test and measurement data may be substituted for numerical analysis.

i. The structural analysis shall consider and incorporate all significant loads and shall evaluate all significant stresses, strains, and deflections that may be experienced by the amusement ride or device against the appropriate material allowable criteria. Applicable loads are provided in (g) through (l) above.

2. In any case, no matter if stresses are determined by analysis, testing or both, loads and stress allowables must be determined irrespective of how stresses are evaluated. For example, if structural adequacy is to be verified via testing, the subject structure must be exposed to all appropriate loads (and there may be several loading conditions to apply) and the resulting measured parameters (strain, deflections, etc.) must be evaluated against some criteria to determine if they are acceptable. The design shall demonstrate that:

i. All appropriate loading conditions have been considered in the design, and

ii. The stresses produced by the expected loading conditions do not exceed the established material allowables.

3. The type of calculation or analysis selected shall be a widely recognized and generally accepted engineering practice. The calculations shall include forces, loads, stresses caused by differential movements of supports due to settlement, elastic and plastic deformations, including the effects caused by such moments of the interfacing structures or machine elements or both.

4. The design shall account for the following loads:

i. Static and operational loads generated during normal operation;

ii. Occasional static and dynamic loads generated during operation (for example, frequent emergency stops, single point failures and multiple point failures);

iii. Static and dynamic loads generated during maintenance operations (that is, asymmetrical jacking);

iv. Patron loads that are even, uneven and exceptional under-load and overload conditions;

v. Loads generated by guests or any other persons;

vi. Loads generated by mechanisms at their full-rated pressure, flow and torque (for example, electric and hydraulic motors, actuators);

vii. Loads generated by hydrodynamic pressure (for example, due to travel through water, water waves, close proximity to waterfalls or moving boats);

viii. Loads generated by operating the amusement ride or device at maximum performance levels;

ix. Loads generated by special testing requirements (for example, increased weight, velocity or acceleration during cycle testing);

x. Loads resulting from shipping, handling, and installation;

xi. Loads imparted by other equipment, adjacent or otherwise;

xii. Environmental loads imposed during operation (for example, seismic loads, operational wind loads, temperature loads (that is, expansion/contraction). This subchapter does not require portable amusement rides and devices to be designed for seismic loads. However, when a portable amusement ride or device is designed for seismic loads, a description of these loads will be stated in the strength calculations, and included in the operating and maintenance instructions; and

xiv. Environmental loads imposed on ride structure without operational loads.

5. Structures shall be analyzed to verify that significant plastic deformation or collapse or both does not occur under any reasonably foreseeable loading condition expected to occur a limited number of times throughout the operational hours used in the design per (c) and (d) above. Examples include environmental loads, patrons attempting to apply excessive (that is, abusive) loads to restraints, extremely heavy patron weights, and loads generated by e-stop events.

6. A deflection analysis shall be required if deformations in structural members or structural systems due to expected loading conditions could impair the serviceability of the structure, as provided at (t) below.

7. The structural analysis for the amusement ride or device shall consider strength and fatigue criteria in the evaluation of stresses resulting from the application of loads. The number of times that a specific load or combination of loads is expected to occur throughout the designated number of operational hours for the amusement ride or device shall determine whether the resulting stress levels will be compared to strength or to strength and fatigue material allowables. The method of analysis and load factors applied to specific loads shall be selected and based upon the number of times loads are expected to occur during the specified number of operational hours (that is, strength versus fatigue evaluation).

8. An analysis of the yield and ultimate strengths and fatigue properties of the materials utilized for all components that could affect safety upon failure of the component shall be required. Empirical testing, or empirical testing in combination with analysis, may be used as a means of evaluating the strength and fatigue properties of the materials for these components. If empirical testing is used for evaluation, the design shall clearly specify and describe the testing procedure and refer to ASTM F 846-92, Standard Guide For Testing Performance of Amusement Rides and Devices.

(p) Impact factor for strength and fatigue analysis:

1. An impact factor of not less than 1.2 shall be applied to all moving (dynamic) loads. If the manufacture or operation of the structures leads to a higher value, the higher value shall be used in the calculations. Amusement rides or devices that exceed 60 miles per hour shall use an impact factor of not less than 1.5 in the calculations unless empirically measured values show that a value less than 1.5 is appropriate.

2. An impact factor more than 1.0 and less than 1.2 may be applied to all moving (dynamic) loads only when the actual impact forces are empirically measured and do not exceed the product of the impact factor and the calculated load.

3. If impact forces (for example, due to vehicles operating over track rail joints), empirically measured during trial runs on the completed structures, are significantly higher than calculated values, then the calculations shall be revised to reflect the measured empirical forces.

4. If the revised calculations show any deficiencies in the structure, modifications shall be made to correct the deficiencies, and the empirical tests shall be repeated.

5. The load impact factor generally accounts for two effects:

i. Dynamic amplification, and

ii. Uncertainties associated with the calculation and analysis of dynamic loads.

6. The design shall account for impact and vibration loads associated with operation of the amusement ride or device when the maximum allowable wear limits for applicable components is reached. Moving loads shall include, but not be limited to, the following:

i. Vehicle;

ii. Kinematic induced loads;

iii. Moving structures (that is, arms on a rotating ride); and

iv. Patron weights.

7. When a structure is subjected to impulsive or shock loads, the peak deflections, internal forces and reaction forces may be significantly higher or lower than if the same loads were applied slowly (that is, quasi-statically). The response of a structure to the application of a particular loading condition is dependent upon the duration and profile (that is, load versus time)

of the loading condition as compared to the fundamental period (that is, the inverse of the fundamental material frequencies).

8. In general, the magnitude of amplification (or reduction) of a structure's response to dynamic loads as compared to the response to static loads can be determined by rigorous dynamic analysis or direct measurement or both. However, rigorous dynamic analysis or testing or both can be expensive and time consuming and is not always practical given other alternatives. In some cases the structure does not physically exist and therefore direct testing and measurement is not possible.

9. One alternative is to apply expected loads or accelerations or both using static analyses and ratio the results by the expected amplification (or reduction) factor as appropriate (or the loads can be ratioed prior to application). The actual amplification (or reduction) factor utilized should be based upon the expected duration of impulse or shock load as compared to the fundamental natural periods of the particular structure being analyzed.

10. The second aspect of the load impact factor pertains to accounting for the uncertainty associated with the calculation and analysis of dynamic loads.

i. For example, rigorous dynamic analysis may be utilized to predict reaction forces applied to guide wheels as a roller coaster ride vehicle traverses a track. In this case, an idealized track geometry is typically assumed, however, the actual loads and accelerations measured after a ride is built and operational are generally found to fluctuate (often significantly) from the nominally expected loads. This is partially due to manufacturing imperfections in the track system (that is, non-continuous smooth bends in track tubing, mismatch at joints, weld beads, etc.). Therefore, the impact factor shall account for uncertainties in dynamic loading. The selection of impact factors and their value is often based upon previous experience, engineering judgment, and sound engineering practice.

11. Impact factors of no less than 1.2 are applied to analytically predicted dynamic loads to account for shock and uncertainty effects. In cases where empirical verification of actual loads are measured, the structural adequacy of existing rides can be verified utilizing impact load factors closer to unity.

12. An example of a component that may have a design-defined maximum allowable wear limit that could effect the impact or vibration loads is tire wear.

(q) Anti-rollback devices:

1. An impact factor of not less than 2.0 shall be applied to anti-rollback devices. If the manufacture or operation of the structures leads to a higher value, the higher value shall be used in the calculations.

2. The fatigue properties for anti-rollback devices shall be verified when operation might cause fatigue damage to the anti-rollback device or its related structures. Otherwise only the strength properties of the anti-rollback device shall be required to be verified.

(r) Vibration factor for structural ride (or device) track components for strength and fatigue analysis:

1. A vibration factor of 1.2 shall be applied to dynamic loads resisted by the amusement ride or device track (that is, track, ties, rails, tie connections and vehicle frame members). This vibration factor is a multiplier to the impact factor.

2. Vibration factors need not be applied to supports or suspensions of the structural components (that is, track backbone, columns) or factored into calculations of:

i. Ground pressures;

ii. Settling; and

iii. Stability and resistance to sliding.

(s) Resonance protection: Certain structures may require special additional provisions for the reduction or attenuation of undesirable vibrations (for example, resonance). Examples of special provisions may include the addition of structural members or adding damping devices to the system.

(t) Serviceability:

1. Serviceability in the context of this subchapter shall mean satisfactory function and performance of an amusement ride or device (and not the ease of maintenance). For example, serviceability shall include verification that maximum deflections that occur during normal operation do not cause interferences or excessive distortions or both.

2. The design of the overall structure and the individual members, connections, and connectors shall be checked for serviceability (that is, deflection, vibration, deterioration, as defined in AISC). Provisions applicable to design for serviceability are given in the AISC Manual of Steel Construction, ASD, 9th edition, Chapter L.

3. Machinery support structures and bases shall be designed with adequate rigidity and stiffness to maintain the required alignment of movable components.

(u) Design for strength:

1. The manufacturer shall perform a load combination analysis according to the equations in section 2.3.2 or section 2.4.1 of ASCE 7-98 or an equivalent standard for local combinations.

i. For live load calculations, dynamic loads shall be included.

ii. Thermal loads affecting components of the ride or foundation shall be included as live loads.

(1) If it can be shown that footings may be allowed to move to accommodate thermal expansion and contraction without degrading the footings' ability to resist other loadings, then thermal loads may be treated separately and taken out of the combined loading equation.

iii. The multiplier for the live load equations 2 and 3 in section 2.3.2 of ASCE 7-98 may be 1.33 instead of 1.6 as long as the live load is already being multiplied by 1.2 for the impact factor.

2. Either of the following two methods shall be acceptable:

i. In the Allowable Stress Design (ASD) method, stresses are calculated in the structure for expected (that is, unfactored, maximum loads). The calculated stresses, sometimes referred to as working stresses, are compared with the material design allowable stress.

ii. In the Load and Resistance Factor Design (LRFD) method, limit states are identified and checked. The two most important limit states applicable to ride structures are static strength and fatigue strength.

(1) LRFD requires that adequate static strength be demonstrated by checking the strength of the structure against the applied loads. The strength is calculated by well-established analytical methods but downgraded by resistance factors to account for statistical effects in materials and manufacturing methods. The loads used in LRFD are generally maximum expected loads factored up to account for the probabilistic uncertainties of these loads.

(v) Design for fatigue:

1. The calculated working stress shall be used when designing amusement rides or devices for fatigue. Because material properties and material behavior may influence the fatigue

analysis, the technique selected for fatigue analysis shall be material dependent. A list of acceptable resources applicable for specific materials follows:

i. For metals that use unwelded material, refer to Stress range or Goodman;

ii. For metals that use welded material, refer to Stress range or Goodman;

iii. For composites, refer to ASTM STP 1330, Composite Materials: Fatigue and Fracture, 7th Volume, The Composite Material Handbook-MIL 17; and

iv. For timber, refer to AF&PA/ASCE 16-95.

2. The total number of load cycles expected to be experienced by the amusement ride or device throughout the operational hours shall be determined and applied in the fatigue analysis.

3. Designing for high cycle fatigue loading requires that the design account for the total number of load cycles the structure will experience during the operational hours. This can be shown either through empirical measurement or by estimating. The total number of load cycles selected then becomes a fundamental ingredient of the structural fatigue analysis.

4. The approach utilized to evaluate a structure for fatigue shall be consistent with the method used for strength design.

5. The means used to calculate and establish fatigue life shall be that in the AISC Manual of Steel Construction, 9th edition, Chapter K or equivalent or that of a widely recognized and generally accepted engineering practice.

6. Components of amusement rides or devices that are not subject to cyclic loading during ride operation can be excluded from fatigue analysis requirements (for example, maintenance storage track, fasteners for transportation, equipment and structures used to set-up and tear-down amusement rides and devices (that is, lifting struts, rigging, etc).

7. For portable rides, an evaluation shall be done in the trailering position and steps shall be taken to provide a bracing system that unloads the ride structure and protects it from fatigue and overload conditions.

(w) Load factors for fatigue:

1. Load factors for fatigue shall be those required in this subchapter.

2. As opposed to the strength analysis, at least one of the loading combinations shall consider a state where the loads are the lowest or opposite direction so as to produce the highest change in stresses in relation to load combinations that produce the highest stress states. Where appropriate, load combinations shall also address the fact that some loads may reverse to produce stresses that may be similar in magnitude, but opposite in sign. It is possible that the maximum fluctuation in stresses might not be produced at all locations due to the same two load combination conditions.

(x) Load combinations for fatigue: Fatigue evaluations shall include loads combined in multiple combinations to produce the largest fluctuations in stresses and strains at all locations within the structure or component being analyzed.

1. In general, several load combinations must be evaluated and the difference between the stresses computed in the various combined loading conditions shall then be utilized to identify the expected fluctuation in stress levels and mean stresses, if applicable. For example, if three possible load combinations are identified to bound the extreme fluctuations, the fatigue analysis should consider the difference in stresses that occur between the three possible permutations (that is, load combinations 1 to 2, 2 to 3, and 1 to 3).

2. In LRFD terminology, the fatigue limit state includes the structural response under expected maximum loads (that is, stresses due to unfactored loads) being checked against a fatigue allowable stress. The allowable stress, consistent with ASD methodology, is reduced

from the expected fatigue strength. It is this reduction in allowable stress that ensures the safety of the structure against fatigue failure. If there is no reduction in fatigue allowable stress compared with fatigue strength, there will be a 50 percent probability of fatigue failure, which is clearly unacceptable. This is a very important consideration in the design of ride structures because the fatigue limit state is the most demanding in most design applications.

(y) Fatigue material allowable properties:

1. When determining allowable stress or strain levels for materials for fixed or permanent amusement rides or devices, the design shall use published fatigue property data (for example, a material specific S-N curve,) for the material being used. In addition, the published fatigue property data for the material shall be representative of the specific structural detail as implemented in the design (that is, plates, weldment, bolted joints, etc.).

i. Published fatigue property data presented as design properties, such as that found in AWS, may be used directly. These properties generally have some factor of safety associated with their use. Published fatigue property data based on empirical data, including those based on mean data, shall be adjusted before use to provide an appropriate factor of safety and allow for material inconsistencies. In the case of mean fatigue property data, the fatigue data shall be reduced by no less than two standard deviations (2σ) to allow for material inconsistencies.

ii. Fatigue property data for a material that is derived from empirical data may be used when published fatigue property data is not available for the material. The proper techniques needed to establish a material's fatigue property data are described in appropriate published technical references and shall be used when employing this method.

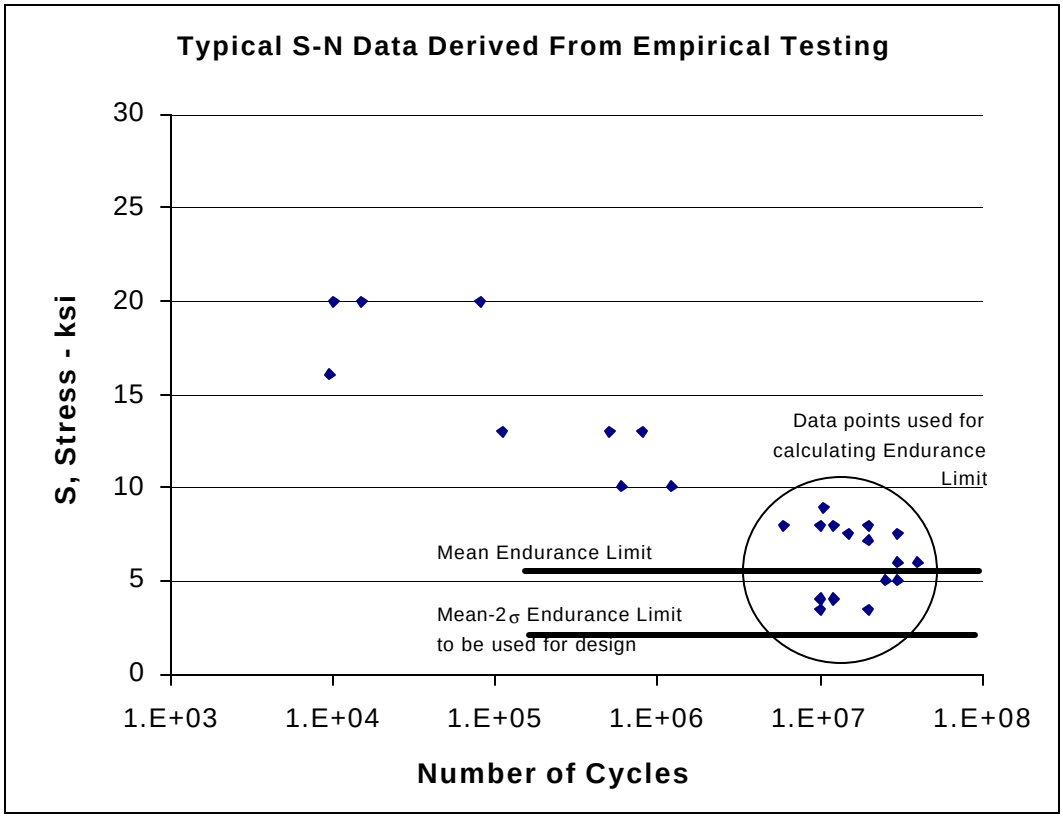
2. The use of mean fatigue property data downgraded by two standard deviations (2σ) provides an appropriate level of safety for general design purposes. Using this adjusted fatigue property data approach will reduce the probability of failure to 2.3 percent. The acceptability of this probability of failure is cited in the literature (see "Fatigue Strength of Welded Structures" by S.J. Maddox, 2nd Ed., 1991, Abington Publishing). It is noted that the "Mean-2σ" approach is incorporated in British Standard BS 5400: Part 10:1980, "Steel, concrete and composite bridges, Part 10. Code of Subchapter for fatigue." It is noted that the design S-N curves developed in BS 5400 are generally consistent with curves given in AWS, AISC and DIN, which make no reference to the factor of safety associated with their use.

3. In the case where the raw fatigue property data is available, the "Mean - 2σ" value can be calculated by standard statistical techniques illustrated in the figure below. In the absence of such data, a reduction of 18 percent for welded joint details shall be used and a reduction of 12 percent for parent materials shall be used.

4. Technical references such as Mechanical Engineering Design by Joseph Shigley or Dubbel Handbook of Mechanical Engineering edited by W. Beitz and K.- H. Kuttner address conditions to be considered, which include:

i. Size factor;
ii. Temperature;
iii. Corrosion;
iv. Notch factors;
v. Miscellaneous effects factor;
vi. Exposure to brominated water; and

vii. Loading mechanism (that is, bending, tensile, shear, axial).



Typical S – N Data Derived From Empirical Testing

Note: The data that correspond to a high cycle count (that is, N> ~1.00E+07) have a mean stress value of 6.3 kips per square inch (ksi) (43.4 MegaPascals (MPa)) and a standard deviation, σ, of 1.8 ksi (12.4 MPa). Thus the "Mean-2σ" value is 2.7 ksi (18.6 MPa) and this is the recommended design endurance limit. Note that for all the points shown, none of the tested specimens would have failed at that stress level. It is possible that if more samples had been tested and they followed the same statistical distribution as the data shown, approximately two percent of the data points would have been below 2.7 ksi (18.6 MPa). However, this is deemed an acceptable level in normal practice.

5. In lieu of computing a two standard deviation reduction from the mean fatigue strength based upon rigorous statistical analysis (when "design" fatigue strength data is not available), an alternate method based upon a strength reduction factor is presented in the third edition of Shigley. Several references, including Shigley, Juvinall and Dowling present data that indicates that the standard deviation of high cycle fatigue strengths of metals utilized in engineering applications is less than eight percent, and based upon this, Shigley has derived a table of "reliability" (that is, strength reduction) factors corresponding to various reliabilities. Note also that the results presented by Shigley also appear to be consistent with data presented in the ASM Atlas of Fatigue Curves. Due to the larger uncertainty associated with the "reliability factor" approach (as compared to rigorous statistical analysis), it is recommended that the reliability factor of 0.75 associated with a three standard deviation reduction (corresponding to

99.9 percent reliability) be utilized. This corresponds to a 25 percent reduction of mean or typical fatigue strength data.

6. Stresses within a structure shall be less than the endurance limit for the material being used. This infers that the structure will last indefinitely without cracking for the given loading duty cycle.

i. Where it is not feasible to keep the stresses within a structure less than the endurance limit for the material being used, where the presence of an endurance limit cannot be justified on the basis of available material data, or in the case of welded components, where the effect of corrosive agents on some metals, especially when in a welded configuration, leads to an S-N curve that does not exhibit a distinct flattened region at high cycle count, a finite life calculation shall be required.

7. Performing cumulative damage analysis: If the Ride Analysis defines primary structure that should be designed or a finite fatigue life, the steps listed in the following subparagraphs should be followed.

i. The first step in a finite life calculation is to identify the stress cycles in a component as induced by the loading history. For example, if we consider a point on a roller coaster rail, this will experience a cycle with a particular stress range each time an axle goes by and will also see a stress cycle associated with the loading of the entire train. The amplitude of this longer cycle would probably be different from the axle stress cycles. The fatigue damage associated with both types of stress cycles would need to be evaluated.

ii. In complex loading situations such as for motion base systems, the identification of stress cycles becomes very difficult and specialized techniques must be adopted. Rain-flow counting is one widely accepted method for this process. Standard fatigue texts should be referenced for detailed treatment of such techniques.

iii. Once the stress cycles have been identified in the structures duty cycle, the next step is to calculate the fatigue damage associated with each type of stress cycle. In other words, the fatigue life must be calculated for each type of stress cycle. Thus, for the roller coaster rail example cited earlier, it is necessary to calculate the life of the rail detail when subjected to the loads from axle number 1, 2 , ... n independently. The life associated with the stress cycle caused by the entire distributed train weight is also required.

iv. The final step in the finite fatigue life calculation is the combination of the life predictions for the various types of loading cycles. This is generally called the cumulative damage calculation and the method generally attributed to Miner and Palmgren is used for this step. In this case, the cumulative damage is the linear combination of the damage associated with each type of stress cycle. Note that fatigue damage is defined as the inverse of the fatigue life. Thus, if the net fatigue life at a particular point, denoted as N years, is the result of fatigue damage from n separate loading events, each with a predicted life of N_i years, the Palmgren-Miner rule gives:

$$N = \left[\frac{1}{\sum (1/N_i)} \right]$$

v. This evaluation completes the finite life fatigue calculation. The resulting fatigue life prediction N is then compared to the specified number of operational hours of the attraction.

vi. There are many methods available to perform structural analysis (for example, hand calculations, finite element analysis, etc.)

vii. Identification of loads and determination of the proper stress allowables are two key elements required to ensure amusement rides and devices possess adequate structural capability.

viii. The procedure to be used to verify that structures possess adequate structural capability consists of the following basic steps:

(1) Identifying all expected external and internal loading including where these loads will be applied;

(2) Calculating, or empirically measuring, stresses and strains;

(3) Determining the appropriate stress allowables (that is, strengths of materials);

(4) Comparing the computed or measured values for stresses or strains, based upon expected loading conditions, to the values for the respective design stress allowables; and

(5) If the calculated stresses are determined to be greater than the material allowables, redesigning and validation of analytical predictions with empirical testing shall be done.

(z) Stability:

1. Portable amusement rides and devices shall be designed such that when erected and operated per the written instructions, the portable amusement ride or device is adequately stable and resistant to overturning. The design shall take into consideration all worst-case loading (for example, unbalanced loading, wind loading).

2. Inspection instructions shall specify how the stability of a portable amusement ride or device is to be visually checked for acceptable settlement and level.

i. This inspection shall be performed after erection is completed and prior to the daily start of operation of the portable amusement ride or device at the installed location.

ii. This inspection instruction shall describe how these measurements shall be assessed, including the maximum amount of settlement and the maximum out of level tolerance allowable for the portable amusement ride or device operation.

5:14A-7.7 Metal structures

(a) For steel structures, the AISC Manual of Steel Construction shall be used for design and acceptance criteria. Another standard may be used if it can be shown to be equivalent.

(b) Only metals and metal alloys for which industry recognized data are available and that indicate the physical capabilities, including endurance limit or fatigue S/N curve, shall be used for structural elements in amusement rides and devices.

(c) Materials shall be resistant to corrosion from salt air or shall be protected from such corrosion.

5:14A-7.8 Timber structures

(a) Timber structures shall be designed in accordance with The Wood Handbook, NDS (National Design Standard) for ASD Design or equivalent standard for structural use of timber.

(b) Allowable loads and stresses provided in the sources listed in (a) may be reduced to allow for special combinations of conditions. These may include stress concentrations, shock, dynamics, load cycles, degree of risk, and environment.

(c) Features that result in a weakening of timber members subjected to impacts, alternating or pulsating stresses shall be avoided. Timber used as structural members that will be subject to impact, alternating and pulsating stresses shall have joints designed with load spreading plates or another recognized methods to relieve local stresses.
(d) Bored holes in timber members, particularly those in which bolts are regularly removed and installed in dismantling operations, shall be relieved from local stresses by the use of suitable load spreading plates or other recognized methods.

1. To prevent compression damage to timber members around fasteners, appropriate methods, such as steel plates or large outside diameter washers, shall be provided. Star washers or other such devices shall not be used in disconnectable timber joints.

2. Where tensile forces associated with holes in timber members act at right angles or obliquely to the direction of the grain, where splitting or tearing of the wood might result, wraparound plates or other suitable means shall be used on either side of fastener holes to absorb these forces.

(e) When timber elements are used in amusement rides and devices, the design shall include details of construction that demonstrate the prevention or reduction of damage due to decay. The design shall include inspection instructions, in accordance with ASTM F 893-87, Inspection of Amusement Rides and Devices, for ongoing inspection requirements for any timber elements. These instructions shall include:

1. Inspection for damaged or missing paint and the presence of moisture;

2. Any situations where water might enter and become trapped, thus supporting the development of rot or insect damage, or failure from expansion due to ice formation. Recommended methods of examinations to determine the presence and extent of rot in timber members shall be provided;

3. Inspection for the presence of corrosion on bolts and/or other fasteners sufficient to produce fretting in the timber and resultant loss of joint effectiveness; and

4. Inspection for otherwise damaged or missing timbers that might affect the load-carrying capacity of the structure.

5:14A-7.9 Concrete structures

The selection of concrete grade shall be in accordance with ACI 301 and ACI 318 or an accepted equivalent standard for structural use of concrete.

5:14A-7.10 Plastic and plastic composite structures

(a) The assessment of allowable loads and stresses in plastic, plastic composite, and bonded structures shall be performed in a manner suitable for that specific material and structure.
(b) The design shall include joint and connection details.

5:14A-7.11 Soft play equipment

Soft play equipment, subject to these rules because of its location with other amusement rides, shall meet ASTM F 1918, Standard Safety Performance Specification for Soft Contained Play Equipment, and all applicable sections of these rules.

5:14A-7.12 Speed-limiting devices and operator presence devices

(a) An amusement ride capable of exceeding its maximum safe operating speed shall be provided with a speed-limiting device.

(b) All powered amusement rides and devices shall be equipped with a properly functioning operator presence device.

1. Exception: For rides and attractions where the operator presence device does not add to safety, including roller coasters, bumper cars, log flumes, go karts and some computer controlled rides, an operator presence device shall not be required.

5:14A-7.13 Passenger tramways

(a) Passenger tramways shall comply with ANSI B77.1-1999, Aerial Passenger Tramways, with the following amendments:

1. Sections 1.1 through 1.3 and section 8 shall be deleted.
2. Any section or provision relating to administration or to reporting shall be deleted.

5:14A-7.14 Fire prevention

(a) Fabrics constituting part of an amusement ride shall be documented to have a flame resistance that meets NFPA 701, or shall meet the NFPA 705 field test. Products which do not meet any of these requirements or an acceptable equivalent standard approved by the Department shall not be permitted.

(b) All materials used in an amusement ride in rider compartments and larger volume or surface area materials shall comply with the following:

1. Materials used in fully enclosed rider compartments where riders cannot get out of the compartment independently shall have a Class I flame spread rating (0-25) in accordance with ASTM E 84 and shall have a smoke development rating of 450 or less. All padding or upholstered materials within the compartments shall have a char length not exceeding 1.5 inches when tested in accordance with NFPA 261.

2. All materials other than those used in fully enclosed rider compartments shall have a Class III flame spread rating (76-200) in accordance with ASTM E 84. For rides in an enclosable building, materials shall have a smoke development rating of 450 or less.

3. Exception: Paints, wall coverings not greater than 1/28 inch thick, lubricants and fuels shall not be required to meet the flame spread and smoke development rating requirements.

5:14A-7.15 Construction requirements

(a) All rides shall be subject to approval pursuant to N.J.A.C. 5:14A-2. Any building or structure associated with, as a functional part of or housing the ride shall be constructed in conformance with the State Uniform Construction Code and maintained in conformance with the State Uniform Fire Code. Additionally, permits and inspections, as required by the State Uniform Construction Code, N.J.A.C. 5:23, or the State Uniform Fire Code, N.J.A.C. 5:70, shall be obtained for the following:

1. Footings and foundations;
2. Plumbing or electrical connections, whether permanent or temporary;
3. Closed construction;
4. Tents; or
5. Flame producing appliances.

5:14A-7.16 Design for loading and unloading

(a) Safe and adequate means of loading and unloading each ride, ride element, or ride vehicle shall be provided. The ride shall be designed to protect against unsafe loading or unloading.

(b) When a ride is in a building, the following shall apply:

1. The minimum clear width to access a seat is 12 inches. If more than seven seats must be accessed, the access width shall be increased by 0.6 inches per seat up to a maximum of 22 inches; and

2. The maximum number of seats that can be accessed from one side is 24 seats or 30 feet, whichever is less.

5:14A-7.17 Pneumatic systems and components

(a) The design and manufacture of amusement rides and devices and modifications to amusement rides and devices shall comply with the applicable provisions of NFPA/JIC T2.25.1M-1986 or equivalent standard, as modified by this section.

1. ISO 4414 Second Edition 1998-08-05, "Pneumatic Fluid Power – General Rules Relating To Systems," shall be considered an equivalent standard.

(b) Deviations, as defined by NFPA/JIC T2.25.1M-1986, are allowed if not prohibited or restricted herein. Any such deviations shall be reviewed and accepted by the manufacturer.

(c) The following changes shall be deemed a part of NFPA/JIC T2.25.1M-1986 for use in this subchapter. Only those provisions or sections with additions or changes are shown herein. Refer to NFPA/JIC T2.25.1M-1986 for other sections.

1. Section 5.9.1.1 shall be amended to read as follows: "Pneumatic circuits shall be designed for a maximum supply pressure of 8 bar (116 psig), unless otherwise specified. Deviations are allowed only when components are designed for higher operating pressures."

2. Section 5.10.1, Manufacturer's Information, shall be amended to read as follows: "The following information shall be permanently indicated on each pneumatic component the component manufacturer's identification:

a) the component manufacturer's part or model designation, where space permits;

b) where applicable, other data required by this standard (see 7.7, 8.4, 9.1, 10.1,11.4 and 12.5)."

3. Section 6.3.6, Locking of adjustable component settings, shall be amended to read as follows:

"To prevent unauthorized access, a means for locking (for example, by means of a key) the enclosure(s) or compartment(s) in which flow control and/or pressure control components are mounted, or for locking their individual settings, shall be provided unless other provisions preclude such access."

4. Section 6.4.2.1 shall be amended to read as follows: "Emergency stop and/or return control, where identified by the Failure Analysis of amusement ride and device equipment, shall incorporate an emergency stop or return control, whichever provides more safety (see 15.7.1). The provided emergency stop or return control shall be in accordance with N.J.A.C.5:14A-7.20."

5. Section 6.4.2.2f shall be deleted.

6. Section 12.2b shall be amended to read as follows: "Adequate internal space shall be provided to accommodate 152 mm (6 in) leads of 14 AWG wire from each electrical supply connection and ground wire."

5:14A-7.18 Pressure vessels, air compressors and hydraulic systems

(a) Pressure vessels shall conform to the requirements of N.J.A.C. 5:11.

(b) Where rides have mechanical or hydraulic energy, these systems shall have a means of being locked out, when necessary, for performing maintenance or inspections.
(c) The design and manufacture of rides using hydraulic systems shall comply with the applicable provisions of NFPA/T2.24.1 R1-2000, with the exception changes made in ASTM F 1159 9.3, or an equivalent standard.

5:14A-7.19 Identification, data plates and manufacturer's information
(a) Every amusement ride shall be identified and shall have a data plate which contains the information required by ASTM F 698-94. This includes, but is not limited to, the following information:

1. The name and address of the manufacturer;
2. A trade or descriptive name of the ride;
3. The manufacturer's serial number;
4. The maximum safe number of riders;
5. The maximum safe speed at which the ride can operate;
6. The minimum and maximum safe weight limit per vehicle or per rider (if applicable);
7. The recommended direction of travel; and
8. The minimum and maximum height restrictions or weight restrictions for riding alone and riding accompanied.

(b) This data plate information shall be legibly impressed on a metal plate or equivalent and permanently affixed in a location on the ride visible at all times.

5:14A-7.20 Safety-related electrical/electronic/programmable electronic control systems
(a) Scope:

1. This section establishes the design requirements for safety-related control systems for amusement rides and devices incorporating electrical/electronic/programmable electronic systems (E/E/PES), associated sensors and final actuator elements and interfaces. Examples of E/E/PES technologies are:
   i. Electromechanical relays;
   ii. Solid state logic;
   iii. PES (programmable electronic systems);
   iv. Motor-driven timers;
   v. Solid state relays and timers;
   vi. Hard-wired logic; and
   vii. Combinations of the above.
2. This section does not address requirements of the non-safety related control system portion of the design.
3. This section does not require a safety-related electrical/electronic/programmable electronic control system.

(b) Referenced standards in this section are as follows:

1. NFPA 79 1997;
2. NFPA 70 2002;
3. EN 1050, EN 954-1 and EN 61496;
4. IEC 61508;
5. ANSI B11.TR3; and
6. UL 508A.

(c) Safety-related control system:

1. General requirements:

i. The safety-related control system shall be capable of maintaining the designed safety integrity level under operating conditions.

ii. Safety-related control systems and functions shall have priority over all other control systems and functions.

iii. Non-safety-related functions within or outside of the safety-related control system shall be designed so that non-safety related functions can not compromise the integrity of the safety-related control system.

(1) This requirement shall not apply to necessary manual procedures (for example, reset, maintenance, evacuation) undertaken with adequate safeguards.

iv. The safety-related control system shall be designed and constructed so that the principles of IEC 61508, Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related systems, and UL 508A, UL Standard for Safety for Industrial Control Panels, are fully taken into account; and

v. The safety-related control system shall be maintained when faults occur.

2. Electro-sensitive protective equipment (ESPE) used for safety-related purposes shall comply with the applicable parts of EN 61496, NFPA 79 or an equivalent standard.

(d) Stop functions:

1. There are three categories of stop functions, as follows:

i. Category 0, which shall mean stopping by the immediate removal of all power to the amusement ride or device (that is, an uncontrolled stop);

(1) An uncontrolled stop shall mean the stopping of machine motion by removing all power to the amusement ride or device with all brakes or other mechanical stopping devices being activated;

ii. Category 1, which shall mean stopping with power to the amusement ride or device to achieve a controlled stop and then removal of power when the controlled stop is achieved;

(1) A controlled stop shall mean that the amusement ride is brought to a stop and then the power is removed; and

iii. Category 2, which shall mean a controlled stop with power left available to the actuators.

2. The choice of category of stop shall be determined in accordance with the requirements of the application, functional requirements of the amusement ride or device, and the ride safety analysis.

i. Where required, provisions to connect protective devices and interlocks shall be provided.

ii. Where applicable, the stop function shall signal the logic of the control system that such a condition exists.

iii. The reset of the stop function shall not initiate any hazardous conditions.

iv. Category 0 and Category 1 stops shall be operational regardless of operating mode and a Category 0 stop will take priority.

v. Category 0 shall remove power to actuators that can cause a hazardous condition (s) as quickly as possible without creating other hazards (for example, by the provision of mechanical means of stopping requiring no external power, by reverse current braking for a Category 1 stop).

vi. Stop functions shall operate by de-energizing the relevant circuit and shall override-related start functions.

3. The Category 0 stop functions shall have the same requirements of a Category 1 or 2 functions and shall also comply with the following:

i. Each amusement ride or device shall be equipped with a Category 0 stop.

ii. When necessary, the safety-related control system may provide Category 0 stopping of the amusement ride or device.

iii. Category 0 stop functions have priority over all other functions.

iv. When a Category 0 stop function is initiated, the amusement ride or device will reach standstill in the shortest time commensurate with avoiding hazardous conditions.

4. Emergency stop functions:

i. Emergency Stop Category 1:

(1) Where a Category 1 stop is used for the emergency stop function, final removal of power to the machine actuators shall be ensured and shall be by means of electromechanical components.

ii. Emergency Stop Category 0:

(1) Where a Category 0 stop is used for the emergency stop function, it shall have only hardwired electromechanical components. In addition, its operation shall not depend on electronic logic (hardware or software) or the transmission of commands over a communications network or link.

5. Category 0 or 1 recovery requirements:

i. After a Category 0 or 1 stop function has been initiated, a restart of the amusement ride or device may not take place without a deliberate manual action. The resetting of the Category 0 or 1 stop function shall not start the ride.

(e) Safety-related parameters:

1. When the ride design defines specific safety-related parameters, the safety-related control system shall not allow the amusement ride or device to exceed the specific safety performance specifications.

(f) Operational modes: Each amusement ride or device shall be permitted to have one or more operating modes (for example, automatic, hand), which shall be determined by the type of ride and its operation.

1. When a safety-related control system has more than one mode of operation, the selected mode of operation must be visibly indicated. Any change of mode shall require deliberate operator action.

2. Where hazardous conditions can arise from mode selection, such operation shall be protected by suitable means (for example, key operated switch, access code).

3. Mode selection by itself shall not initiate operation. A separate action by the operator shall be required.

4. Safeguards shall remain effective for all operating modes.

i. Where it is necessary to temporarily override one or more safeguards, a mode selection device or means capable of being secured in the desired mode shall be provided to prevent automatic operation. In addition, one or more of the following measures shall be provided:

(1) Initiation of motion by a hold-to-run or other control device;

(2) A portable control station (for example, pendant) with an emergency stop device; Where a portable station is used, motion shall only be initiated from that station.

(3) Limiting motion speed or power; or
(4) Limiting the range of motion.

5:14A-7.21 Electrical requirements

(a) Scope:

1. This section provides guidelines for the electrical components, their installation and procedures, used in amusement rides or devices. This general section includes all electrical components from the point of electrical power connection through the amusement ride or device.

2. The National Electrical Code (NEC, NFPA 70-2002), NFPA 79 1997, and UL508A are the basis for the design and manufacture of electrical systems and components in these requirements, except as modified by these rules. This section provides supplemental requirements to these codes and standards to improve the level of electrical design for amusement rides and devices. Other equivalent standards or alternate methods may be used.

i. In Subsection 525.21(A) of the National Electrical Code, Rides, Tents and Concessions, Disconnecting Means, the phrase "Where accessible to unqualified persons" shall be deleted.

3. This subchapter does not cover the following:

i. Electrical systems or components prior to the connection point of the electrical lead wires to the source of power for the amusement ride or device; or

ii. A building, structure, or facility that is not defined as an amusement ride or device.

4. Section arrangement: This section is divided into subsections which follow the general layout of NFPA 70, National Electrical Code (NEC) See Table 7.21 below.

i. In this section, subsections (a) through (d) apply generally to all amusement rides and devices; subsections (e) through (l) are for special types of equipment, occupancy or conditions, which may modify subsections (a) through (d).

TABLE 7.21

Subsection	Description ASTM F 1159 Section Number	NFPA 70-NEC 2002 Chapter
(a)	Scope	
(b)	General requirements for Electrical Installations	2
(c)	Wiring Methods & Materials	3
(d)	Equipment for General Use	4
(e)	Special Equipment	6
(f)	Audio/Communications Systems	6 and 8
(g)	Portable ride assembly/disassembly conditions	5

5. Compliance: All existing equipment that undergoes a major rewire must be comply with this section. Major rewire is defined as replacement of one-third or more of the electrical wiring and/or components.

6. Documentation requirements for all rides and devices:

i. Signage Requirements: There shall be a plaque, permanently mounted on main electrical panel that contains, as a minimum, the following information:

(1) The main supply voltage – power;
(2) The main supply voltage – lighting;
(3) The total power load amperage;
(4) The total motor load amperage;
(5) The total lighting load amperage;
(6) The number of electrical power phases;
(7) The number of lighting power phases;
(8) The electrical power frequency;
(9) The year version of NEC used for design;
(10) The year version of ASTM 1159 used in design;
(11) The date of electrical system manufacture; and
(12) The name of the responsible engineer or designer.

ii. All amusement rides and devices shall have a complete set of electrical schematics and diagrams available.

iii. All electrical outlets operating at more than 120 volts to the ground shall be clearly marked to indicate their voltage.

(b) General requirements for electrical installations:

1. Wiring and protection:

i. Branch Circuits Required: An individual 125 volt 20-ampere branch circuit with at least one GFCI protected receptacle outlet shall be provided on each ride for use as a service or utility outlet.

2. Disconnects:

i. Multiple disconnecting means shall be grouped and shall be labeled, as appropriate, at the disconnecting location.

ii. Rides or devices with other voltage sources (that is, central battery systems, etc.) shall have a disconnecting means with an approved means of lockout/tag-out. This disconnect shall either be located immediately adjacent to the primary main disconnect or the primary main disconnect(s) shall be labeled to show the location of this disconnect.

3. Grounding:

i. All stepping and control transformer secondaries shall be grounded;

ii. All enclosures, switchboards and panel boards shall have an approved grounding bar installed; and

iii. No overcurrent protection device shall be installed in neutral or grounding conductors.

(c) Wiring methods and materials:

1. Wiring systems shall be protected against damage from unique conditions inherent on amusement rides and devices.

2. All electrical enclosures used for a portable ride or device shall be rated minimum "NEMA 3R," equivalent, or better as necessary to address environmental conditions.

3. Exposed switches shall be protected against damage from unique conditions inherent on amusement rides and devices.

4. Wiring systems and methods shall follow the NEC and other accepted electrical industry standards and procedures.

(d) Equipment for general use:

1. Lighting fixtures:

i. Lighting fixtures made onto or from structural components of the ride or device must meet the criteria of the NEC for electrical installation, including cord restraints, outlet boxes, and wiring. Fixtures shall have provisions for the unique conditions inherent on amusement rides and devices.

ii. All fluorescent lighting systems located on a moving component of the ride or device and or within seven feet six inches of a guest shall have a protective covering and a means of tube retention for the light tubes.

iii. Quartz halogen double-ended bulbs:

(1) The bulb shall have a protective shield or film tape over diffuser lens to protect from falling glass;

(2) The bulb may not be mounted only by the yoke or neck on any moving or portable component of the ride or device; and

(3) Light sockets: Due to the nature of decorative lighting flasher systems, the screw shell base of the bulb may be energized except where riders and bystanders may have access to it. When energized bases are used, warning labels shall be used which indicate the need to de-energize the lamps prior to replacement of light bulbs. These labels shall be installed, as a minimum, on the lighting panel and on each extended light fixture or can.

2. Due to fine stranding of portable cable, methods and materials shall be used to ensure that all devices are used within their rating.

3. The motor size shall take into account the number of start cycles per hour and unique ambient operating conditions inherent on amusement rides and devices.

4. All Y to Y connected transformers shall have a common neutral.

5. Power capacitors used in the electrical system shall be labeled or shall have equivalent notification. Appropriate lockout /tag out procedures shall be available.

6. Collector ring/brush assemblies shall be of a type and size to carry 125 percent of rated load for each ring and brush assembly.

i. Provisions shall be made for a grounding ring(s) capable of carrying the largest overcurrent device feeding the slip ring set.

7. Recognized or listed components shall be of the "Industrial Equipment" type (UL508A) and used properly within their restrictions. These include, but are not limited to, terminal blocks, supplementary overcurrent protection, residual current detectors, fans, and relays, both mechanical and solid state.

8. Electrical equipment with temperature and/or humidity requirements shall be installed to insure the equipment manufacturer's requirements are met.

(e) Special equipment:

1. Metal frames structures, which contain electrical devices but have no metal-to-metal direct bonding path, shall be bonded. A separate equipment-grounding conductor installed between the metal parts shall bond non-current carrying metal parts and main disconnect.

i. Grounding and bonding conductors shall be only of copper material.

2. Wet areas:

i. Three classification of wet areas exist which determine what NEC code is relevant:

(1) Class 1: Guest Immersion – NEC 680II Permanently Installed Pools;

(2) Class 2: Guest Contact – NEC 680V Fountains; and

(3) Class 3: Misting/Splashing/Pooling/Fogging – will be treated as a wet location.

3. Signs and outline lighting:

i. Systems with incandescent lamp holders shall be marked to indicate maximum wattage and voltage of lamps. Markings shall be permanently installed in letters at least one-quarter inch high (6.4 mm) and shall be either visible while re-lamping or shall be near or on the most visible lighting control or branch circuit overcurrent protection panel board.

ii. Metal poles used as supports for lighting and as raceway for wiring shall comply with the following conditions:

(1) Incandescent and fluorescent fixtures on any material shall be grounded with a mechanically affixed ground wire or shall be protected by a residual current device (RCD).

iii. Wiring terminations at the end of lighting circuits shall terminate in an approved insulated irreversible compression connector, or such means that the possibility of contacting any part of the ride or device while the lighting fixture is energized is reduced.

(f) Audio/communication systems:

1. When installed on amusement rides or devices to provide audio notifications announcements for safety, operation, evacuation, and/or maintenance of the ride or device, audio/communication system wiring shall be suitably protected to address the unique operating conditions inherent on amusement rides and devices.

(g) Portable ride assembly/disassembly conditions:

1. Wiring methods with connectors/plugs that are not rated to make/break under load shall be permanently marked at each connecting point or shall have a listed integral disconnect to make/break.

5:14A-7.22 Internal combustion engines

Internal combustion engines for amusement rides shall be of adequate type, design, and capacity to handle the design load.

5:14A-7.23 Chain

(a) Chain and related accessories shall be selected and designed for specified design loads, speed, corrosion, operating environmental and dynamic conditions, and for wear and fatigue.

(b) Chain manufacturer’s specifications shall include dimensions, strength, grade, and nominal breaking strength-working load limit, and shall be included in the maintenance instructions.

(c) The capacity of the chain and related accessories, for example, terminations, adapters, shall be verifiable either by certificates, manufacturer's markings, or testing.

(d) Chains in the primary load path that do not pass around sprockets or wheels shall have a minimum factor of safety of 5.

(e) Chains in the primary load path that pass around sprockets or wheels shall have a minimum factor of safety of 6.

(f) The chain factor of safety shall be defined as the ultimate tensile strength of the chain divided by the maximum steady state tension

(g) A method shall be used to maintain proper chain contact with sprocket teeth and pulleys.

(h) The amusement ride and device manufacturer shall include in the maintenance instructions the method to measure chain wear and the maximum allowable change in pitch length.

(i) Metallic chain guides shall be lined or appropriately protected.

(j) The amusement ride and device manufacturer shall include cleaning and lubrication details in the maintenance instructions.

(k) Chains on lift hills shall be retained in the trough.

5:14A-7.24 Wire rope

(a) Wire rope may be used in systems such as drive, suspension, tension, braking, and counterweight.
(b) Wire rope consists of individual wires that are twisted into strands that form the rope.
(c) Wire rope used in aerial tramways and aerial lifts shall comply with ANSI B77.1, Passenger Ropeways.
(d) Wire rope and wire rope accessories, including terminations, adapters, and clamps, shall be designed for the specified designdrive configuration, cycles, load(s), corrosion, dynamics, environment, wear, fatigue, and service conditions.
(e) Wire rope and wire rope accessories in the primary load patch shall have a minimum factor of safety of 6.
(f) The wire rope factor of safety is defined as the ultimate tensile strength of the wire rope divided by the maximum steady state tension
(g) The capacity of the wire rope and related accessories, for example, terminations, adapters, shall be verifiable either by certificates, manufacturer's markings or testing.
(h) Wire rope systems shall be configured to minimize the forming of kinks or knots on any part of the wire rope system from normal use, and shall be designed to avoid excessive local stressing of individual elements. for example, individual wires or strands within the rope.
(i) Where indicated by the Ride Analysis, wire rope systems in operation should be configured so that operators and patrons are not exposed to hazards in the event that a rope or associated fitting derails and leaves its controlled or intended path.
(j) Where indicated by the Ride Analysis, wire rope systems in operation should be configured so that operators and patrons are not exposed to hazards in the event that a wire rope fails and fractures, unravels, or experiences fatigue.
(k) All splices shall be done according to the rope manufacturer’s wire rope splice specifications.
(l) A method shall be used to maintain proper rope contact with sheaves and pulleys.
(m) For fatigue applications, the minimal sheave to rope diameter (D/d) shall be 30. The sheave diameter is D and the rope diameter is d. When space restraints preclude this ratio, then other mitigating factors, such as more frequent in-service inspections or replacement criteria, shall be in place.
(n) Where determined by the Ride Analysis, sheave inertia shall be considered in the design to minimize scuffing.
(o) When determined by the Ride Analysis, life cycle tests per OIPEEC standards shall be performed to validate rope fatigue and life calculations.
(p) Wire rope guides shall be lined or appropriately protected.
(q) The wire rope manufacturer shall recommend the type and frequency of lubrication and corrosion protection. Ropes that have little or no motion, such as ropes in static tension systems, anchors, and guys, require special consideration for protection against corrosion.

5:14A-7.25 Anti-rollback devices

(a) Anti-rollback devices prevent an amusement attraction from unplanned or undesirable movement in the reverse direction.

(b) Anti-rollback devices are not required if, under any failure of the amusement ride or device, movement in the reverse direction will not result in injury or damage.
(c) Amusement rides or devices where cars or trains travel uphill, by being conveyed on an ascent ramp, for example, roller coaster lift, or being carried uphill by their own momentum or power, shall be provided with safety devices to prevent reverse direction of the car or train. Adequate load ratings must be considered in the design of this equipment pursuant to N.J.A.C. 5:14A-7.6, Loads and strengths. Vehicles that provide their own power and have manual or automatic braking systems are excluded from this requirement.

1. Safety devices include anti-rollback mechanisms or automatically acting brakes that do not depend on temporary stored energy, for example, electrical, hydraulic, pneumatic, etc.

(d) When the primary lift drive device is not configured to be an anti-rollback, no less than two anti-rollback devices are required. Both can be on the vehicle/train, both can be on the track, or one can be on the vehicle/train and one on the track. When a rollback has occurred, at least one anti-rollback device shall be engaged until the rollback has been corrected.
(e) Lift systems, for example, log rides, rapids rides, may have anti-rollback devices on the vehicle/boat, on the side of the track or on the conveyance device.
(f) Individual cars of trains that are not equipped with a secondary safety device to prevent uncontrolled reverse travel, shall be mechanically coupled together and have a secondary safety attachment between cars, for example, safety chain, safety cable, etc.

5:14A-7.26 Machine guards

(a) The manufacturer shall provide machine guards or other appropriate measures to inhibit employees and patrons from undesirable contact with belts, chains, pulleys, gears, drivelines, and similar moving machinery.
(b) When the ride analysis determines that parts, such as u-joint drives, may break free on power transmissions, provisions shall be made to contain the components.
(c) Drive shafts shall be provided with safety containment.
(d) Chain and sprocket guards shall be provided in compliance with ANSI/ASME B15.1, Safety Standards for Mechanical Power Transmission and Conveyors and Related Equipment.

5:14A-7.27 Patron lifting or elevating devices

(a) Hoists:

1. Hoist units associated with lifting or elevating patrons shall be visually inspected based on the amusement ride and device manufacturer's recommended inspection period, but not to exceed one year.

2. Hoist units (rope and chain hoists) shall be equipped with effective brakes or other equivalent devices. Stopping movement shall conform to N.J.A.C. 5:14A-7.20, Safety-related electrical/electronic/programmable electronic control systems.

3. The hoist unit shall be arranged so that the physical connection between the brake and sprocket cannot be interrupted. The brake shall be inseparably attached together in one unit

4. Guard against over-travel malfunction of the hoist.

5. End limit protection shall be provided. The intent is not to restrict normal travel limits of the amusement ride or device, but the manufacturer is to provide specified maximum limits of travel.

6. If required by the Ride Analysis, overload protection shall be provided.

7. That part of the rope drum that contacts the rope shall be designed such that entanglement, overlay, and kinking shall be prevented by means of grooving, guiding, etc. A minimum of two full turns of rope shall remain on the drum when the attached lifting carriage is operated to its lowest possible position.

8. Hoist drums shall be no less than (D/d) of 30 to 1. D is the diameter of the drum and d is the diameter of the rope.

9. Means shall be provided to minimize variation in tension between all connected ropes or chains where more than one rope or chain is fixed to one common suspension point.

5:14A-7.28 Power screw drives and rack and pinion drives

(a) Power screw drives:

1. Power screw drives associated with lifting or elevating patrons shall be visually inspected based on the amusement ride and device manufacturer's recommended inspection period, but not to exceed one year.

i. Power screws used for amusement rides and devices shall be properly designed or selected for the application.

ii. End limit protection shall be provided. The intent is not to restrict normal travel limits of the amusement ride or device, but the manufacturer is to provide specified maximum limits of travel.

(b) Rack and pinion drives:

1. Rack and pinion drives associated with lifting or elevating patrons shall be visually inspected based on the amusement ride and device manufacture's recommended inspection period, but not to exceed one year.

2. Rack and pinions used for amusement rides and devices shall be properly designed or selected for the application.

3. A rack and pinion should have at least one pinion, one rack, and two backup rollers, which shall act on the same sections of rack as the drive pinion. Driving machines utilizing a two-sided rack, where two drive pinions are located so that they are opposite to each other and act as backup roller, shall be deemed to have met this requirement. (ASME A17.1, Section 1604.1)

4. Racks shall be fitted with devices at both ends to prevent the pinion from traveling beyond its designed maximum limits of travel at either end of the rack.

5. The design/configuration of driving pinions shall provide a minimum engagement with the rack of at least two-thirds of the tooth width and one-third of the tooth depth.

5:14A-7.29 Brakes

(a) As it applies to amusement rides and devices, examples of braking devices include, but are not limited to: longitudinal friction brakes, disc or drum brakes, motor end brakes, either on-board or off-board of the patron-carrying vehicle or device. Some rides, for example, swing rides, may not use brakes in an e-stop condition, since it is safer to let the ride come to a controlled stop.

(b) In certain cases these devices also may be used as trim or retarding brakes to maintain the desired ride or device speed profile.

(c) The selection and design of brakes for amusement rides and devices shall be in conformance with N.J.A.C 5:14A-7.20, safety-related electrical/electronic/programmable electronic control systems.

5:14A-7.30 Stopping and emergency brakes

(a) Stopping and emergency brakes shall be selected and designed to meet the needs of the ride analysis and shall perform as required under any design conditions and use.

1. If cars or other components of an amusement ride may collide upon failure of normal controls, an emergency brake shall be provided.

(b) All rides requiring emergency brakes shall be designed so that no single component failure will cause the failure of the emergency brakes.

(c) All rides with emergency brakes shall be equipped with an automatic system that causes correct positioning (closed or open) of the device preventing a vehicle from entering a zone or block ahead of it that is occupied.

1. Redundant safety systems shall be require for all amusement rides required to have emergency brakes pursuant to (a)1 above. In the event of a single component failure, the redundant safety system shall prevent two vehicles or two trains from occupying the same block at the same time.

2. Alternative systems that achieve the same result may be used.

(d) Amusement rides and attractions that make use of multiple vehicles or trains shall be equipped with a "failsafe" braking system that, in the event of a complete power failure, is positioned to stop all vehicles or trains at the next stopping location. Should a stoppage occur, some vehicles may be on elevated parts of the ride. A written procedure for evacuation shall be in place to address such situations.

(e) All remote operator stations shall be equipped with an emergency stop button or stop button for the purpose of correctly positioning the emergency brakes to stop the vehicle without allowing it to pass to another block in the event of an emergency.

(f) All emergency braking systems utilizing air to activate the brakes shall have a pressure sensing device installed after the main air source which causes an emergency stop condition in the event of loss of air pressure.

(g) All emergency braking systems utilizing air to activate the brakes shall have an individual holding tank at each set of brakes with a "check valve" or "one way valve" to prevent complete loss of air pressure in the event of a line break or compressor fault.

5:14A-7.31 Retarding, trim, or reduction brakes

Retarding, trim, or reduction brakes shall be selected and designed to meet the ride analysis and shall perform as required under any design conditions and use.

5:14A-7.32 Parking brakes

Parking brakes shall keep the ride from moving during loading and unloading. In some cases, the brake may be a dynamic brake that stabilizes the ride.

5:14A-7.33 Quality assurance program

(a) The quality assurance program for manufacture, assembly, erection, modification, or reconditioning, shall contain, at a minimum, all of the following:

1. Drawings:
    i. Drawing numbers shall be unique;
    ii. Revision blocks shall be clear and track what changed in the revision;

iii. If jigs were fabricated or used, each jig shall have a jig identification, and each jig used shall be identified, with appropriate settings, on the assembly or fabrication drawing;

v. Drawings shall adhere to an accepted drawing standard;

2. Welding:

i. Welding, when necessary, shall conform to AWS D1.1 or an equivalent standard;

ii. Pre-qualified weld joints shall include base metal, electrodes, inserts, weld preparation, inert gas shielding requirement, backing, speeds, feed rates, techniques, preheat requirements, and postheat requirements;

iii. AWS or equivalent certified welders shall be qualified on the pre-qualified weld joint(s) they actually weld;

iv. Welds shall be inspected by AWS or equivalent certified weld inspectors;

3. Machining requirements shall identify how requirements are met and how they are checked;

4. Materials:

i. Material certifications shall be obtained for each material ordered that is related in any way to structure or safety;

ii. Flame retardant certification shall be obtained for all materials with a specified flame retardance, including, but not limited to, fabrics and plastics;

iii. A method shall be in place to verify that the material called for on the drawing is received and is actually used in the part or assembly;

5. A method shall be in place to assure that assemblies are done properly;

6. A method shall be in place to assure that erection of the ride is done properly;

7. Testing shall be performed, in accordance with ASTM F 846-92, on the ride, and subassemblies and parts, if necessary; and

8. When timber is used, it shall be stored and assembled in such a way as to eliminate or to minimize decay or rotting. Inspection points shall be set up so that timber may be evaluated at several steps during the process to ensure the highest quality.

i. Prior to assembly into the ride, fasteners shall be inspected to ensure that there is not corrosion sufficient to produce fretting in the timber thereby reducing joint strength.

5:14A-7.34 Fencing, guardrails, handrails and gates

(a) When fences and gates used provide protection to spectators and riders or guardrails are used to inhibit falls from elevations in primary circulation areas for patrons, they shall be constructed to meet the minimum requirements in (b) through (f) below.

(b) General:

1. Fencing, guardrails, and handrails shall be designed, constructed, and erected to inhibit overturning by spectators or riders.

i. Fences and gates shall be constructed as to inhibit: spectator contact with the ride or device, or rider contact with fences or gates, or both; and spectator – rider contact while the ride is in operation.

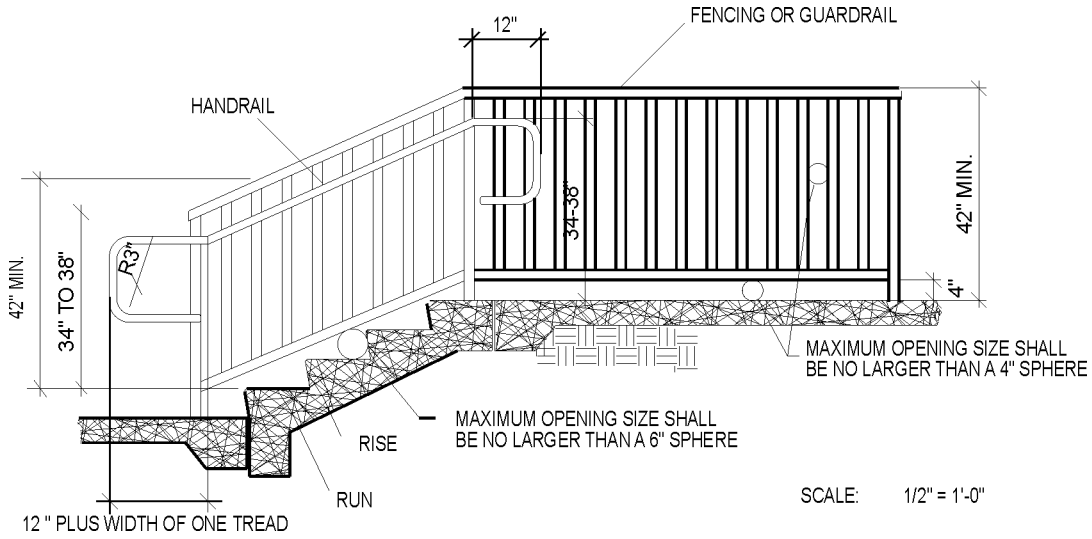
ii. Guardrails that are part of permanent facilities must be capable of withstanding a load of at least 200 pounds applied in any direction at any point on the rail and shall be designed to resist a load of 50 pounds per linear foot applied in any direction and to transfer the loads through the supports to the structure.

(c) For level landings and ramps:

1. When fencing, gates and guardrails are provided on level landings or ramps, they shall be constructed in accordance with the following:

i. They shall be a height of at least 42 inches above the surface on which the spectators or riders stand.

ii. They shall be constructed in such a fashion so as to reject a four-inch diameter sphere at all openings.



Fencing or Guardrail & Handrail Diagram for Level Landings or Ramps

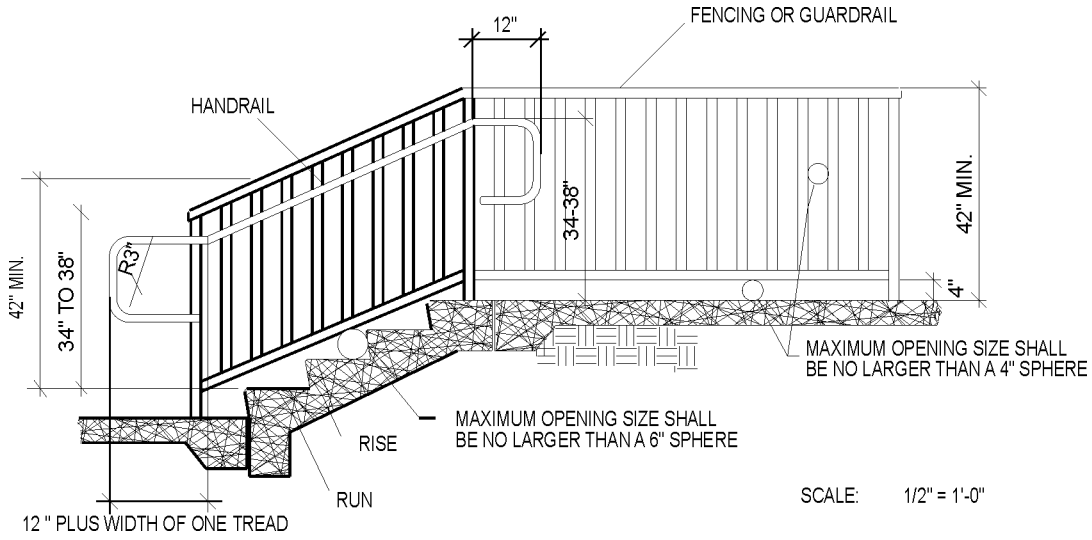
(d) For stairs:

1. When fencing and guardrails are provided on stairways, they shall be constructed in accordance with the following:

i. Guardrails and fences at stairs shall be installed at 42 inches above the nosing of each tread to the top of the guardrail.

ii. They shall be constructed in such a fashion so as to reject a four-inch diameter sphere at all openings.

(1) Exception: The triangular openings formed by the riser, tread and fence or guardrail shall reject a six-inch diameter sphere.

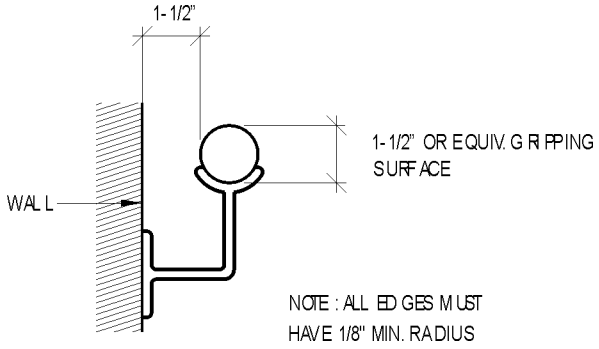


Fencing or Guardrail & Handrail Diagram for Stairs

2. When handrails are provided at stairs they shall be 1-1/2 inch nominal diameter and installed at 34 to 38 inches above the nosing of each tread to the top of the handrail.

i. The clear space between handrails and the guardrails shall be 1-1/2 +/- ¼ inches.

ii. They shall extend at least 12 inches beyond the top riser and at least 12 inches plus the width of one tread beyond the bottom riser. At the top, the extension shall be parallel with the floor or ground surface. At the bottom, the handrail shall continue to slope for a distance of the width of one tread from the bottom riser, the remainder of the extension shall be horizontal.



Handrail Mounting Detail

(e) For lift hills, guardrails shall have a top rail, an intermediate rail and a toe board.

(f) Gates:

1. Where used, entrance, exit, and loading gates shall open away from the ride or device unless equipped with a positive latching or holding device meeting the rail loading requirement of (b) above.

2. Gates shall be designed such that if opened during the amusement ride or device cycle, the gate will not contact the amusement ride or device or cause a hazard to riders.

3. Gates shall be self-closing and self-latching or have an operator.

5:14A-7.35 Means of access and egress

(a) All walking surfaces, including, but not limited to, waiting areas, loading and unloading areas, platforms, landings, stairs and ramps, shall be stable, firm and slip resistant.

(b) Safe and adequate means of access to and egress from an amusement ride shall be provided. Stairways or ramps and connecting landings or platforms shall be provided where the entrance to or exit from a ride is not at grade.

(c) A building housing an amusement ride shall comply with the requirements of the Uniform Construction Code (N.J.A.C. 5:23).

(d) When a ride is in a building, the exit access travel distance shall be measured from the most remote point on the ride to determine compliance with the maximum exit access travel distance requirements of the Uniform Construction Code.

(e) Where the ride itself creates an enclosed space, two means of egress shall be provided.

1. A single means of egress shall be permitted if the occupant load does not exceed 50 persons and the exit access travel distance does not exceed 75 feet.

2. Dead end passageways shall not exceed 35 feet.

(f) The normal "access only" path may be used for egress in an emergency provided that the path is clearly marked as a means of egress and there are no obstructions (for example, one-way turnstiles) blocking egress travel.

(g) Stairs: All stairs on amusement rides shall comply with the following:

1. Stairs used for unassisted egress shall be 22 inches in width minimum for single lane passage or 44 inches for double lane passage.

2. Stair tread shall be dimensionally uniform within a given run. The maximum tolerance between largest and smallest tread and risers shall be 0.375 inches.

(h) Ramps: All ramps on amusement rides shall comply with the following:

1. Ramps used for unassisted egress shall be 22 inches in width minimum for single lane passage or 44 inches for double lane passage.

2. Ramps attached to lift hills shall have a slope not exceeding 20 degrees provided that the operator controls emergency evacuation and that the ramp is otherwise used only for maintenance and inspection access.

i. Where the slope exceeds 25 degrees, stairs that conform to the slope of the lift hill or another means of access shall be provided.

3. Ramps attached to rides which provide normal access to vehicles shall have a slope not to exceed 15 degrees when necessary to conform to the contour of the ride.

i. Where the slope exceeds 21 degrees, stairs that conform to the contour of the ride or another means of access shall be provided.

5:14A-7.36 Welding

(a) Welding procedures shall be in accordance with American National Standards Institute/ American Welding Society (ANSI/AWS) or American Society of Mechanical Engineers (ASME), or equivalent standards. All welding used as a method of fabrication or assembly shall conform to AWS D1.1, Structural Welding Code or equivalent.

(b) For this section on welding, equivalent standards are those which meet the ANSI/AWS and ASME welding process methodology. This methodology is outlined in the paragraphs below:

1. Full and complete information regarding location, type, size, effective weld length and extent of all welds shall be clearly shown on the drawings.

2. Drawings and documentation shall clearly indicate by welding symbols or sketches the details of groove-welded joints and the preparation of material in making them. Special conditions shall be fully explained by added notes or details.

3. Welding process shall be performed in accordance with a written Weld Procedure Specification (WPS) that specifies the applicable essential variables in accordance with the criteria of the applicable code. The specific values for these WPS variables shall be obtained from the Procedure Qualification Record (PQR). Essential variables may include: weld process, joint design, base material, filler material, shielding, preheats, position, electrical characteristics, technique and travel speed.

i. The WPS shall state the tolerances on an essential variable as indicated by the applicable standard

4. A WPS shall be qualified in accordance with procedures indicated by the applicable standard and documented on the Procedure Qualification Record (PQR) which serves as written confirmation of a successful WPS qualification.

5. Only welders, welding operators, and tack welders who are qualified in accordance with the applicable standard shall perform welding. Welders, welding operators and tack welders shall be qualified by testing as indicated by the applicable standard and documented on a Welding Performance Qualification Record (WPQR).

6. The welding personnel shall follow a WPS applicable to the qualification test.

7. The WPQR shall serve as written verification of welder qualification and shall list all applicable essential variables as indicated by the applicable standard. (see Form E-1 in AWS D1.1 Annex E).

8. Welding performance standards that do not have acceptance or workmanship criteria shall not be considered an equivalent standard.

(c) Welding process inspection:

1. Inspectors shall meet the criteria in accordance with the applicable standard. An inspector can be an engineer or technician who, by training or experience, or both, in metals fabrication, inspection and testing, is competent to perform the inspection of the work.

2. The inspector shall verify that all welds conform to the acceptance or workmanship criteria of the applicable standard, and to the drawings and documentation,

3. The size and contour of welds shall be measured with suitable gauges.

4. Visual inspection for cracks in welds and base metal and other discontinuities shall be aided by a strong light, magnifiers or such other devices.

5. The inspector shall verify that only materials conforming to the specifications contained within the drawings and documentation are used.

6. The inspector shall review all WPSs used for the work and shall verify that the procedures conform to the criteria of the applicable standard.

7. The inspector shall inspect the work on a sampling basis and at suitable intervals during the process to verify that the criteria of the applicable sections of these rules have been met.

8. The inspector shall inspect the welding equipment used for the work to verify that it conforms to the criteria of the applicable standard.

9. The inspector shall verify that electrodes are used only in the positions and with the type of welding current and polarity for which they are classified.

10. The inspector shall review for accuracy and applicability the record of qualifications of all welders, welding operators, and tack welders; all WPS qualifications or other tests that are made; and such other information as may be appropriate.

(d) Records of the qualifications of all welders, welding operators, tack welders, WPS qualifications or other tests that are made, applicable inspections and such other information as appropriate shall be maintained pursuant to the record retention policy in these rules and shall made available to those authorized to examine them.

5:14A-7.37 Mechanical fastening

(a) General:

1. Mechanically fastened connections, that is, bolted, riveted, or other types as applicable, shall be designed in accordance with industry accepted engineering practice and standards, for example, AISC Manual of Steel Construction, or other standards producing equivalent results in the country of manufacture.

2. All bolts, cap screws, and studs shall be SAE Grade 5, ASTM A325, equivalent or better. The manufacturer may determine and demonstrate that other grade fasteners may be used, in which case, they shall be required for that ride. In safety-related structures, fasteners other than SAE Grade 5 or ASTM A325 shall be proof tested by lot.

i. Exception: Graded fasteners shall not be required where the Ride Analysis indicates that they are not necessary.

3. Information defining the specification (for example, type, grade, material, strength, coating) for each fastener to be used in the ride or device shall be clearly specified in the design documentation.

4. Fasteners tensioning information (dry or lubricated) shall be included in the manufacturer provided drawings (for example, torque value or turn of nut).

5. Manufacturers shall determine all fastener information to be included in maintenance and inspection instructions.

6. SAE Grade 8 (ISO Grade 10.9) fasteners that have been previously torqued to a value greater than 75 percent of the ultimate strength should not be reused.

(b) Washers:

1. Designs shall take into consideration the force under the head of a bolt or nut compared to the compressive yield strength of the clamped material.

2. Hardened flat washers shall be used under the heads of all bolts and nuts when fasteners SAE Grade 8 (ASTM A490, ISO Grade 10.9) and above.

i. Exception: Other washers may be used if specified by the Ride Analysis.

3. Flange headed bolts and nuts may be used as an alternate to washers.

4. Designs utilizing oversized or slotted holes shall use appropriately sized (thickness and diameter) washers.

(c) Locking systems:

1. Locking spring type washers, for example, split, toothed, star, serrated, shall not be used with fasteners of strength grade levels, SAE grade 5, ISO grade 8.8, or higher. Locking type bendable tab washers are acceptable.

2. The ride analysis shall identify fasteners that require a means to visually verify that the fastener has not loosened since the last torque (that is, torque stripe, safety wire, torque tabs, etc.).

(d) Holes and surfaces:

1. Holes for fasteners shall be sufficiently perpendicular to the fastener bearing surfaces (bolt and nut) to avoid detrimental bending forces on the fastener. In cases where this is not possible, bearing surfaces for the fastener head and nut shall be made sufficiently perpendicular to the hole through the use of beveled washers or spot machining of the bearing surface(s) being clamped.

2. Material surfaces within the clamped grip, such as fastener bearing surfaces and corresponding surfaces of all items being held together by the fastener, shall be free of burrs, foreign materials and other substances which might prevent solid seating and reliable sustained clamping of the assembled parts when fastener is tightened to the specified torque.

3. Consideration shall be given to the characteristics of the materials being clamped, for example, the possibility of cold flow or creep of plastics, paint or other materials within the joint that might contribute to long term relaxation.

SUBCHAPTER 8. INSTALLATION REQUIREMENTS (RESERVED)

SUBCHAPTER 9. OPERATION

5:14A-9.1 Title; scope; intent

(a) This subchapter, adopted pursuant to authority of the Carnival- Amusement Rides Safety Act and entitled "Operation," shall be known and may be cited throughout the regulations as N.J.A.C. 5:14A-9, and when referred to in this subchapter may be cited as "this subchapter."

(b) This subchapter establishes the procedures for owners, operators and manufacturers to follow during the operation of a carnival-amusement ride in New Jersey to assure that the ride is properly set-up, maintained and will be safe for the riding public.

(c) All rides shall be maintained in conformance with the manufacturer's specifications and the approved design.

5:14A-9.2 Required notice, itinerary and book-on rides

(a) No amusement ride shall be used at any time or location unless prior notice of intent to use the same has been given to the Department.

(b) Notice of planned schedules shall:

1. Be in writing;
2. Identify the ride;
3. State the intended dates and specific locations of use including the municipality, street and street number or block and lot; and
4. Include any additions or book-ons which will be operating at the site.

(c) Such written notice shall be mailed to P O Box 808, Trenton, New Jersey 08625-0808 or faxed to a telefacsimile number provided for that purpose to attention of the Department at least five days before the first intended date of use.

(d) Book-on rides included after initial notification in (b) above shall provide the same information as in (b)2 and 3 above.

(e) When a book-on ride is included outside of the initial notification, the owner shall give at least 72 hours advance notice to the Department before the ride is placed in operation.

5:14A-9.3 Daily maintenance and operations inspections and tests

(a) Operators shall not operate any ride that has not had a daily maintenance inspection and operational inspection, if applicable, and checklist done prior to opening to the public on that day.

(b) Daily maintenance checklists and operational checklists, if applicable, are to be completed by a qualified person experienced and instructed in the proper operation and maintenance as per the manufacturer's specifications of the ride. Maintenance and operations shall be performed within the timeframe specified in the maintenance or operating manual and records shall be made and retained in compliance with N.J.A.C. 5:14A-4.7.

(c) The Department shall not inspect or issue a permit for a carnival-amusement ride without a current copy of the following items being on site and available to the inspector:

1. The manufacturer's set up and assembly manual;
2. The manufacturer's maintenance manual;
3. The manufacturer's operation manual;
4. The daily maintenance inspection and checklist;
5. The daily operational inspection and checklist;
6. The daily maintenance log; and
7. The NDT plan, if applicable.

(d) The maintenance or operational checklist shall include, but not be limited to, the following:

1. The name of the ride being checked;
2. The name and signature of person completing the checklist;
3. The date of the checklist;
4. A detailed list and description of all items being checked. Items listed shall be at a minimum those required by the manufacturer; and
5. Testing within the timeframe specified in the operating manual of all control devices, speed-limiting devices, block system, emergency brakes, automatic and manual lowering devices and any other equipment provided for safety.

(e) A daily maintenance log shall be kept for all work performed on each ride. The daily maintenance log entry shall include, but not be limited to, the following:

1. The name of the ride;
2. The name and signature of the maintenance person or persons performing the maintenance; and
3. The nature of the work, for example, malfunction, maintenance, violation abatement, etc.;
   i. If other than routine maintenance, a notation as to the reason;
   ii. If safety bulletin, a reference to the manufacturer's bulletin;
   iii. If “order to cease violations” issued by a regulatory agency, a reference to said order;
   iv. Account of all work performed and all parts repaired or replaced;
   v. A copy of the manufacturer's recommendations for repair or repair procedures, if any.

(f) The maintenance checklist shall be done prior to the ride being opened to the public. The maintenance checklist may be done by the same person that will be operating the ride as long as that individual is qualified to perform the maintenance checklist.

(g) After all required maintenance is completed and prior to opening the ride to the public, the ride operator shall perform the operational inspection and complete the checklist.

(h) Individual tubs, sweeps, vehicle chassis, bents, towers, and supports to ground shall be uniquely identified and marked with no more than a combination of six characters or numbers to facilitate identification during maintenance and inspection.

5:14A-9.4 Identification, data plates and manufacturer's information

(a) A data plate that conforms to the requirements of N.J.A.C. 5:14A-7.19 shall be affixed to each ride.

1. Where no manufacturer's serial number is available and the ride was manufactured prior to the effective date of these rules, an identification number supplied by the owner and registered with the Department shall be used.

5:14A-9.5 Inspection after assembly

An amusement ride shall be inspected for compliance with the manufacturer's assembly requirements by a qualified person each time the ride is assembled.

5:14A-9.6 Prohibited use

(a) No person shall knowingly use or permit to be used an amusement ride which is not properly assembled or which is defective or unsafe in any of its parts, components, controls or safety equipment.

(b) No ride shall be used if all manufacturer's requirements, based on current bulletins, have not been completed.

(c) No ride shall be used without a current Certificate of Compliance issued by the local fire inspector, if required.

(d) No ride shall be used without a valid Certificate of Occupancy or Certificate of Approval issued by the local construction official, if required.

(e) No ride shall be used without a current and valid annual ride permit except as allowed by this chapter.

(f) No ride shall be used without a New Jersey State serial number except as allowed by this chapter.

(g) No ride with a maximum safe operating wind speed shall be used if the wind velocity exceeds the manufacturer's recommended safe operating wind speed. Wind speeds shall be measured with an anemometer mounted at a high point capable of being read from ground level or the operations office or tied into the control system to prohibit starting or to shut down the ride if operating.

(h) No ride shall operate after being issued a shut down order from the Department until the ride has had and passed a complete inspection by the Department unless the order allows operation to resume or unless re-inspection is waved by the Department.

(i) No ride requiring NDT shall be operated without the receipt of a current NDT report by the Department based on the current NDT plan filed with the Department.

(j) No ride shall be permitted to operate without correction of all items on the list of non-conformances issued by the inspector unless the inspector gives the operator a specific completion date and permission to operate until that date.

5:14A-9.7 Site layout

(a) The site on which rides are to be erected shall be reasonably:

1. Free of large rocks and debris that might pose a hazard;

2. Well maintained to ensure safe operation;
3. Free of holes that might pose a hazard;
4. Sufficiently level to allow safe operation of the ride; and
5. Far enough away from vehicle traffic to provide a safe environment for the public.

(b) Wherever required by the manufacturer, proper protection between the amusement device and the ground shall be provided.

(c) Whenever foundations are required for a ride, the owner shall submit the required documentation pursuant to N.J.A.C. 5:14A-2.12 and 2.13.

5:14A-9.8 Control of operation

(a) All amusement rides shall have an operating manual. The owner of an amusement ride shall operate the ride in accordance with the manufacturer's operating manual. In the absence of a manufacturer's operating manual, the owner shall write an approved operating manual. Where any conflict occurs between the operating manual and this chapter, this chapter shall govern. The operating manual shall be kept at the site where the ride is in use and shall be available for use by the Department.

(b) The owner shall ensure compliance with the requirements of N.J.A.C. 5:14A-4.8 for ride operators.

(c) The ride operator shall not allow anyone obviously under the influence of alcohol or drugs to ride the ride.

(d) The ride operator shall operate no more than one ride at any given time.

(e) The ride operator shall monitor the riders until the ride is completed.

(f) The correct number of operators necessary to safely operate the ride, based on the operating manual, shall be on site and in the correct location(s).

(g) The Department may require additional operators in the event of "blind spots." An additional operator with emergency stop capabilities shall be stationed in each "blind spot" location during operations.

(h) An operator shall not leave the ride unattended without disabling the controls so the ride cannot be started by unauthorized persons. If the ride is left unattended and disabled during an operational day, the operator, upon returning, shall run a complete cycle of the ride.

(i) The operator or operator assistants shall check each and every restraint, constraint, seatbelt, lap bar and any other device used in securing riders into a vehicle individually to assure that it is locked properly and that the rider fits properly in the safety system.

(j) Additional operation start button(s) shall be provided where loading and unloading operations are being performed in an extended area where safety restraints, harness and other devices are required to prevent ejection from the ride during operations. The start button(s) shall work in series in that all button(s) shall be depressed by operators before the ride will start.

(k) The operator or operator assistant shall check the height, weight or size of riders, as applicable, with the height mark, scale or other means of measurement provided by the owner. The means of measurement shall enable the operator to determine whether a rider meets the required limit in a "go, no go" fashion. No one who does not meet the required limits shall be permitted to ride the ride.

1. When the weight of a rider is used to determine entry to or use of an amusement ride, an accurate scale shall be provided.

2. A rider not meeting the approved height restriction may be accompanied by a companion if provided for in the manufacturer's operations manual or otherwise specified by the

manufacturer. Companions shall meet any requirements given in the manufacturer's specifications. The larger person shall be by the exit door to ensure it stays closed and latched during operation unless this arrangement of riders creates a conflict with 3. below.

3. Where riders are of disparate sizes, riders shall be placed in the ride such that any action caused by centrifugal forces shall push the weight of the lighter rider into the heavier rider.

4. Riders at or above the maximum weight may be allowed if such riders are provided for in the manufacturer's operations manual. Distribution of such riders shall be as per the operations manual.

(l) All powered amusement rides and devices shall be equipped with a properly functioning operator presence device.

1. The operator shall be in constant contact with the operator presence device at all times during normal operation of the ride. This rule shall not be construed to prohibit riders from using amusement ride operating controls designed for use by a rider.

2. The operator presence device shall be tested at each inspection.

3. Exception: For rides and attractions where the operator presence device does not add to safety, including roller coasters, bumper cars, log flumes, go karts and some computer controlled rides, an operator presence device shall not be required.

(m) The ride operator shall exercise control over the ride to prevent dangerous actions by a rider.

(n) In the event of an emergency stop, routine stop (for the purpose of loading or unloading of a rider), or a stop for any other reason, the operator or operator assistants shall assure that no other riders have exited their vehicles unexpectedly.

5:14A-9.9 Operator qualifications and training

(a) The ride operator shall be at least 16 years of age.

(b) The ride operator or operator assistant shall not operate any ride while under the influence of drugs or alcohol.

(c) The ride operator shall be properly trained before being assigned the duties of operating a ride. The operator training shall include, but shall not be limited to, any manufacturer's recommendations for the operation of the ride. The owner shall require a certification to be signed by each ride operator and operator assistant indicating the ride name and operator's level of authority regarding the ride. This certification shall be kept on file by the owner for at least three years.

(d) The ride operator shall have a copy of the manual and shall have the ability to read and understand the manual as written by the manufacturer and to safely operate and communicate safe riding policies to the public for the ride.

(e) The operator and all operator assistants shall have a complete knowledge of the operation of the restraint system, lap bar locking system, seatbelts and the proper way to seat a rider in a vehicle.

(f) The operator and all operator assistants shall be trained to be aware of the motions and sounds attributed to the normal operation of the ride. The operator shall be familiar with how the ride looks when it is functioning normally, and be alert to any unusual conditions. If there are any changes in the normal operating condition, operation shall cease and the owner shall be called immediately. The owner will decide the appropriate action to be taken.

(g) Operators and operator assistants shall know the whereabouts of all safety equipment such as fire extinguishers, emergency main electrical disconnect, lock-out point and nearest telephone for routine or emergency assistance.

5:14A-9.10 Lock-out procedure

(a) All amusement ride disconnecting devices shall be provided with a means of lock-out. Where rides have mechanical, pneumatic or hydraulic energy, these shall have a means of being locked out when necessary for doing maintenance and inspections.

(b) The ride operator or maintenance staff shall lock-out the disconnect switch when restoration of power to an amusement ride could create a hazard to persons during the performance of maintenance, repair, inspection or an emergency evacuation of riders, and ensure that it remains locked-out until such time that restoration of power will not create a hazard.

(c) All amusement ride owners shall have in place a written lock-out procedure.

(d) A lock-out shall not be removed by any person other than the person who installed it, except as allowed by the written procedure for lock-outs. Lock-outs put in place by the Department shall be removed only by the Department.

5:14A-9.11 Set up, maintenance and repair operations affecting structural integrity or key **components**

(a) Amusement rides and attractions shall have no corrosion or pitting affecting structural integrity or the functioning of key components.

(b) Rides shall be operated and maintained in compliance with the manufacturer's specifications for fatigue loading. No holes shall be drilled into tubing that might compromise the integrity of the structure without written permission from the manufacturer. In the event the manufacturer does not exist, a professional engineer licensed to practice in the State of New Jersey shall review and approve, in writing, the actions and reasons for said actions. The manufacturer or the professional engineer shall show, from materials standards or from the maintenance manual, that the proposed hole sizes and locations will not compromise the integrity of the structure.

(c) No structural shaft may be cross-drilled or welded without the written permission of the manufacturer. In the event the manufacturer does not exist, a professional engineer licensed to practice in the State of New Jersey shall review and approve, in writing, the actions and reasons for said actions.

(d) During installation, set-up to begin seasonal operational or assembly after disassembly for mechanical malfunction, an owner shall use or order to be used fasteners supplied by or the equivalent to those specified by the manufacturer.

1. All pins used shall adhere to manufacturer's specifications in length, hardness and type.
2. All safety pins, such as “R” keys, and “cotter pins,” shall be as per manufacturer's specifications.
3. All fasteners shall be tightened to manufacturer's specified torque values.

(e) Before being used by the public, amusement rides shall be so placed or secured with blocking, cribbing, outriggers, guys or other means as to be stable under all operating conditions.

(f) Any and all welding done on the amusement ride shall be performed by a welder certified by the American Welding Society (AWS) or an acceptable alternative welding certification with proof of certification on site at all times.

(g) Any and all work performed by a machine shop, repair facility, or a third party of any kind for any reason shall be done to the documented specifications of the manufacturer or of a professional engineer licensed to practice in the State of New Jersey, as appropriate, based on the approved written repair plan.
(h) All work done shall be done to manufacturer's specifications.
(i) Prior to re-inspection following a repair, documentation for the repair shall be provided from the maintenance manual or from an original letter from the manufacturer.

1. When requested by the Department, copies of all correspondence regarding a specific repair not covered in the manual shall be sent to the Department. Copies of subsequent correspondence shall be sent as they occur.

2. If a manufacturer no longer exists or no other manufacturer has taken over responsibility for the technical support of the ride, then the ride owner shall make the repair following accepted engineering practice. Notice of such repair, including a description of the repair procedure, shall be given to the Department.

i. The owner takes responsibility for the repair and may be required to have the repair certified by a licensed professional engineer or other individual acceptable to the Department.

5:14A-9.12 Vehicle integrity

(a) The interior and exterior parts of all rider carrying amusement rides with which a rider may come in contact shall be smooth and rounded, free from sharp, rough or splintered edges and corners, with no protruding studs, bolts, screws or other projections which might cause injury.
(b) Interior parts upon which a rider may be forcibly thrown by the action of the ride shall be adequately padded.
(c) Seatbelts, lap bars, straps, shoulder harnesses, chains, secondary locking devices and any other form of restraint, constraint or containment device shall be in proper working order or vehicle shall be tagged "Out of Service."
(d) Handholds, bars, footrests and other equipment as may be necessary for safe entrance and exit to and from amusement rides shall be provided and maintained in a safe condition. Such equipment shall be of sufficient strength to support the riders.
(e) Where only individual units of a ride, such as cars, seats or other carriers are defective and not in compliance with this chapter, such units shall be taken out of service and clearly marked with a sign reading "Out of Service," provided, however, that such defects do not jeopardize safety and that removing these units does not unbalance the ride.

5:14A-9.13 Voice communication and signal system

(a) Voice communication shall be provided between the ride operators at the entrance, intermediate points, and the termination of an amusement ride where voice communication improves control of the ride by reducing a hazardous condition created by distance or lack of visibility between these points.
(b) An additional operator and a signal system shall be provided where the operator of the ride does not have a clear view of the point at which riders are loaded or unloaded. The additional operator shall be stationed so as to be able to observe all areas not visible to the operator of the ride.

(c) For rides and attractions which require a spoken message of instruction or warning prior to operation, this message shall be given in a manner that is clearly audible to all riders prior to the start of each ride cycle. This message shall be in writing in the operation manual.
(d) Any code of signals adopted for the operation of any amusement ride shall be printed and kept posted at both the operator and signalman's stations. All persons who may use these signals shall be carefully instructed in their use.
(e) Signals for the movement or operation of an amusement ride shall not be given until all riders and other persons who may be endangered are in a position of safety.

5:14A-9.14 Proximity to high voltage lines
Amusement rides shall be located so that they conform to the requirements of the High Voltage Proximity Act, N.J.S.A. 34:6-47.1 et seq.

5:14A-9.15 Ride loading and unloading
(a) The means of loading and unloading from each ride shall be maintained in compliance with the manufacturer's specifications and N.J.A.C. 5:14A-7.16.

1. Controls and dimensions in place as of the effective date of these regulations shall be permitted to remain. All replacement components shall comply with the requirements of N.J.A.C. 5:14A-7.16 to the greatest extent possible.

5:14A-9.16 Means of access and egress
(a) Safe and adequate means of access and egress from amusement rides shall be maintained and shall be free from debris, obstructions, projections and slipping, tripping and other hazards.
(b) A building housing an amusement ride shall comply with the requirements of the Uniform Construction Code (N.J.A.C. 5:23) or the Uniform Fire Code (N.J.A.C. 5:70-4), as appropriate.
(c) Handrails shall be provided for stairs or ramps with a change in elevation of 30 inches or greater. Guardrails shall be provided along all open-sided walking surfaces, platforms, stairways, ramps and landings which are located more than 30 inches above the floor or grade below.

1. Handrails or guardrails shall be continuous without interruption and shall be free of any sharp or abrasive elements.

2. Existing guardrails shall be at least 30 inches above the ramp surface or nose of steps and 42 inches above landings.

i. Newly-installed or replacement guardrails shall be at least 42 inches above the ramp surface, nose of steps or landing.

3. Handrails and guardrails shall be maintained so that they are not hazardous for use under emergency exiting conditions.

5:14A-9.17 Emergency brakes and anti-rollback devices
Emergency brakes and anti-rollback devices shall be provided and maintained in compliance with N.J.A.C. 5:14A-7.25, 7.30 and 9.3. If any apparent damage, beyond normal wear, as indicated in the maintenance manual, is occurring to the anti-rollback dogs, the ride shall be shut down and the actual impact factor tested for and designed for or mitigated and any other damaging factor accounted for and mitigated.

5:14A-9.18 Protection against moving parts or other hazards and clearance envelopes

(a) Owners, operators and operator assistants shall be aware of any construction equipment or vehicles operating in the immediate vicinity. Any equipment encroaching on the normal range of motion (clearance envelope) of the ride shall be removed to a safe distance or the ride shall not be operated.
(b) An amusement ride shall not be used or operated while any person is so located as to be endangered by it. Areas in which persons may be so endangered shall be fenced, barricaded or otherwise guarded against public intrusion.
(c) Where a public access, queuing, loading or unloading area is under the ride, overhead protection from objects that might reasonably be expected to fall from a ride (for example, items carried or worn by riders) shall be provided.
(d) Machinery used in or with an amusement ride shall be enclosed, barricaded or otherwise effectively guarded against contact. Guards removed for maintenance purposes shall be replaced before normal operation is resumed.
(e) Amusement rides which are self-powered and which are operated by a rider shall have the driving mechanism so guarded and the guard so secured in place as to prevent riders from gaining access to the mechanism.
(f) Each mechanical ride shall be rendered inoperable when not attended or in use.
(g) Clearance envelopes shall be maintained as per manufacturer's specifications at all times during the operation of an amusement ride.
(h) Decorations, such as flags, or lighting fixtures shall be secured in a fashion that they will not create a hazard to riders or members of the public in the event of high winds or normal vibration caused by moving equipment and shall be placed far enough from the ride so as not to encroach on the clearance envelope.

5:14A-9.19 Rider restraint, restrictions, containment
(a) Restraining, containing or cushioning devices shall be maintained in compliance with the manufacturer's specifications and N.J.A.C. 5:14A-7.3.

1. The design requirements of N.J.A.C. 5:14A-7.3 shall not apply to devices in place as of the effective date of these rules. Replacement devices shall comply with N.J.A.C. 5:14A-7.3 to the greatest extent possible.

5:14A-9.20 Overload and over speed
(a) An amusement ride shall not be overcrowded, or loaded in excess of its safe carrying capacity. The maximum safe number of riders listed in the manufacturer's operations manual and on the data plate affixed to the ride shall govern loading.
(b) Amusement rides and attractions clearly suitable for children only shall not carry adults, unless allowed by the manufacturer’s operations manual.
(c) Amusement rides shall not be operated at an unsafe speed or at any speed beyond that recommended by the manufacturer. The maximum safe operating speed of an amusement ride can be found in the operations manual provided by the manufacturer and on the data plate affixed to the ride.
(d) An amusement ride capable of exceeding its maximum safe operating speed shall be provided with a maximum speed-limiting device.

1. An amusement ride requiring a maximum speed-limiting device shall have the device connected in the control circuit immediately bringing the ride to a safe stop if the ride exceeds the maximum safe operating speed or the device is disabled or malfunctioning.

2. The speed-limiting device shall not be by-passed or disabled in any way.

3. The Department, when necessary, shall require the testing of speed limiting devices by the owner or owner's representative for reasons of ensuring proper functioning of these devices.

5:14A-9.21 Electrical equipment and wiring

(a) All electrical equipment and wiring shall be installed and maintained in compliance with N.J.A.C. 5:14A-7.21.

1. Equipment and wiring in place as of the effective date of these regulations shall be permitted to remain provided that is not in an unsafe or hazardous condition. Replacement or new equipment and wiring shall conform to the requirements of N.J.A.C. 5:14A-7.21.

i. Such work shall be identified in the maintenance log required to be maintained pursuant to N.J.A.C. 5:14A-9.3.

2. The continuity of the grounding conductor system used to reduce electrical shock hazards shall be verified as outlined in section 525.32 of the NEC each time a portable ride is connected.

3. During assembly/disassembly, no energized points/surfaces shall be exposed to any personnel.

5:14A-9.22 Pressure vessels, air compressors, pneumatic and hydraulic systems

(a) Air compressors, air compressor tanks and appurtenances used in connection with amusement rides and attractions shall be designed, constructed, equipped and maintained to ensure safe operation.

1. Air compressors and holding tanks used in air systems for amusement rides shall be marked with one of the following certifications:

i. ASME: American Society of Mechanical Engineers; or

ii. An equivalent certification approved in advance by the Bureau of Boiler and Pressure Vessel Compliance in accordance with N.J.A.C. 5:11.

2. Air compressor tanks and other air receivers used in connection with air compressors shall be inspected to manufacturer's specifications at least once a year by a qualified person and a record of each inspection shall be kept in the maintenance log at the ride at all times.

3. Air compressor tanks and other air receivers used in connection with air compressors shall have the maximum allowable working pressure conspicuously marked thereon.

(b) Air compressor tanks and other receivers used in connection with air compressors shall comply with the provisions set forth at N.J.A.C. 5:11, concerning boilers, pressure vessels and refrigeration.

(c) Air systems used in connection with safety-related devices on rides and attractions shall have a pressure-monitoring device which causes an emergency condition and ride stoppage in the event of loss of air pressure.

1. In the event of power or air system pressure failure, all components shall fail to a position which will put the ride into the safest condition even if a mechanical means is needed to do that.

2. In the event of restoration of air or power, the system shall not operate automatically without action by the operator to reset the system and restart the ride.

(d) Pneumatic tubing, hose and fittings shall conform to Society of Automotive Engineers (SAE) standards or equivalent.

(e) Hydraulic or pneumatic systems and other related equipment used in connection with amusement rides shall be free of leaks, clean and maintained to ensure safe operation at all times.
(f) When necessary, hydraulic systems shall be equipped with a thermostat to sense overheating and prevent premature failure of components and ride breakdown.
(g) An amusement ride which depends upon hydraulic or pneumatic pressure to maintain safe operation shall be provided with a positive means of preventing loss in hydraulic pressure that could result in injury to a rider.

1. In the event of power, air pressure or hydraulic pressure failure, all components shall fail to a position which will put the ride into the safest condition even if a mechanical means is needed to do that.

2. In the event of restoration of air, power or hydraulic pressure, the hydraulic system shall not operate automatically without action by the operator to reset the system and restart the ride.

(h) Hydraulic or pneumatic lines shall be guarded so that sudden leaks or breakage will not endanger the riders or the public.

5:14A-9.23 Fire prevention

(a) All rides manufactured after the operative date of these rules shall meet and be maintained in compliance with the requirements of N.J.A.C. 5:14A-7.14.
(b) Replacement materials shall comply with the flame retardancy requirements of N.J.A.C. 5:14A-7.14.
(c) Approved fire extinguishers shall be provided in accordance with NFPA 10. Flammable waste, such as oily rags and other flammable materials, shall be placed in covered metal containers. Such containers shall not be kept at or near exits.
(d) Gasoline and other flammable liquids and flammable gases when stored shall be kept in approved containers in reasonably cool and ventilated places and in accordance with Federal guidelines for storage of such materials. Smoking or the carrying of lighted cigars, cigarettes, pipes, candles or other open flame is prohibited in any area where such liquids or gases are stored or are transferred from one container to another.

5:14A-9.24 Non-destructive testing

(a) Non-destructive testing shall be performed by the owner pursuant to the provisions of the nondestructive testing plan required at N.J.A.C. 5:14A-2.15, with such additional requirements as may be established by the Department for a specific ride.
(b) The nondestructive testing plan shall include, but not be limited to:

1. The part to be tested, including photographs or illustrations;
2. The percentage of parts of each type to be tested;
3. How often the parts are to be tested; and
4. Type of NDT specified by manufacturer.

(c) The owner shall prepare a report, in writing, for all non-destructive tests performed.
(d) The report of the non-destructive tests shall include the following:

1. The name and business address of the owner;
2. The date and location where the test was performed;
3. The name of the ride;
4. The manufacturer's name and the serial number of ride;
5. The name and business address of firm that conducted the test;

6. The type of non-destructive test performed and a description of the test equipment by name and serial number;

7. The results and certification of results and the criteria used for acceptance or rejection of the part(s);

8. The part name, part number, and quantity of each part that was inspected;

9. A statement that the test was performed in compliance with the ride manufacturer's maintenance manual or bulletin, identifying the bulletin by number and giving the date of publication or revision, a copy of the NDT statement, U.S. Consumer Product Safety Commission (CPSC) test requirement, owner's requirement or Department requirement being followed;

10. A detailed map, drawing, or photograph of sufficient clarity showing the area tested;

11. If rejected, a detailed sketch of the area repaired, the manufacturer's recommendation for repair, repair method used and the results of the retest;

12. Level of certification and signature of person performing test; and

13. Level of certification and signature of person interpreting the test results.

(e) The report required in (d) above shall be received by the Department prior to operation of the ride in the State or prior to the expiration date of the NDT report on file with the Department.

(f) The inspector witnessing the NDT or inspecting the ride for the first time shall receive a copy of the technician's field report to submit with the inspection report.

(g) In the event a visual NDT inspection is ordered by the manufacturer or a regulatory agency, and discontinuities are found, the owner or regulatory agency shall order additional NDT inspection using another more stringent method of NDT inspection.

(h) A visual weld or crack inspection ordered by a manufacturer in the form of a safety bulletin requiring a “qualified person” to perform the test, shall be done by a Level II NDT technician or a AWS certified welder and the testing shall be done in accordance with AWS D1.1 testing standards.

5:14A-9.25 Wind and storm hazards

(a) Operators and operator assistants shall be aware of weather conditions including, but not limited to, wind, rain, lightning and any approaching storm.

(b) An amusement ride which is exposed to wind or storm shall not be operated under dangerous weather conditions except to release or discharge riders.

(c) Manufacturer wind and weather related restrictions shall be followed during periods of wind or storm. The restrictions shall be addressed in the operation manual, which shall be on site at all times.

5:14A-9.26 Accident, incident or mechanical breakdown reporting

Accidents, incidents or mechanical breakdowns shall be reported as required by N.J.A.C. 5:14A-4.13.

5:14A-9.27 Imminent danger

(a) If the Department finds that an amusement ride presents an imminent danger, a notice warning all persons against the use of the ride shall be attached to the ride. Such notice shall not be removed until the ride is made safe, re-inspected and then the warning notice will be removed by the Department.

(b) The amusement ride shall not be used while the Department's notice is posted.

5:14A-9.28 Cleanliness

(a) A suitable number of trash containers shall be provided in and around amusement rides. Accumulations of trash shall be promptly removed.

(b) All parts of amusement devices and temporary structures used by riders or customers shall be maintained in a clean condition.

(c) The operator and operator assistants are responsible for the cleanliness of the ride.

5:14A-9.29 Water quality

(a) Water impounded by the ride owner and used as an integral part of a water amusement ride, whether it be a part of a water contact ride or a water noncontact ride, which could expose the public to a safety or health hazard shall be maintained in a safe and sanitary condition in accordance with this section.

(b) The owner of any water amusement ride as described in (a) above shall provide evidence of the sanitary condition of such water when requested by the Department and shall comply with N.J.A.C. 8:26, as applicable.

(c) Impounded water, when in use, shall be:

1. Sufficiently clear to permit the bottom of the water reservoir, at its deepest point, to be visible from an outside edge of the reservoir.
2. Aesthetically pleasing;
3. Free of floating or suspended matter; and
4. Sanitary for water contact rides.

5:14A-9.30 Lighting

Amusement rides, access thereto, and means of egress therefrom, while in operation or occupied, shall be provided with illumination by natural or artificial means sufficient to guard against injuries to the public.

5:14A-9.31 Wire rope

(a) Wire rope on amusement rides shall be thoroughly examined periodically. Wire rope found to be damaged shall be replaced with new rope of proper design and capacity as per the manufacturer's specifications. Any of the following conditions shall be cause for replacement:

1. In running ropes, six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay;
2. In pendants or standing ropes, evidence of more than one broken wire in one rope lay;
3. Any condition which causes the loss of more than one-third of the original diameter of the outside individual wires;
4. Severe corrosion;
5. Kinking, crushing, bird-caging, or other damage resulting in distortion of the rope structure;
6. Heat damage;
7. Reduction from normal diameter of more than 3/64 inch for diameters up to and including 3/4 inch, 1/16 inch for diameters, 7/8 inch to 1-1/8 inches, 3/32 inch for diameters 1-1/4 inches to 1-1/2 inches;
8. Bird-caging or other distortion resulting in some members of the rope structure carrying more load than others; or

9. Noticeable rusting or development of broken wires in the vicinity of attachments. When this condition is localized in an operational rope, it may be eliminated by making a new attachment.

(b) Wire ropes used to support, suspend, bear or control forces and weights involved in the movement and utilization of tubs, cars, chairs, seats, gondolas, other carriers, the sweeps, or other supporting members of an amusement ride shall not be lengthened or repaired by splicing. In addition, these shall have a redundant support system capable of carrying the full load. Redundancy of the support system may also be accomplished with a design that includes a higher safety factor in the manufacture of the support system.

(c) Rides utilizing vehicles hanging or suspended from a wire rope shall relocate the vehicles on an annual basis as required by manufacturer's specifications.

(d) Previous fastening points shall be clearly marked for identification when disassembling.

5:14A-9.32 Internal combustion engines

(a) Internal combustion engines shall be of adequate type, design, and capacity to handle the design load.

(b) Where fuel tanks of internal combustion engines for amusement rides are not of adequate capacity to permit uninterrupted operation during normal operating hours, the amusement ride shall be closed down and unloaded or evacuated during the refueling procedure. The fuel supply shall not be replenished while the engine is running.

(c) Where an internal combustion engine for an amusement ride is operated in an enclosed area, the exhaust fumes shall be discharged to the outside.

(d) Internal combustion engines for amusement rides shall be located to permit proper maintenance and shall be protected by guards, fencing or enclosure.

5:14A-9.33 Rider conduct

(a) The owner shall have the right to refuse any member of the public admission to a ride if his or her bearing or conduct might endanger himself, herself or other members of the public.

(b) The owner shall have the right to refuse admittance to any ride if the intended rider's health or physical condition makes it unsafe for him or her to use the ride.

(c) The owner shall refuse a rider admission to a major or super ride if the rider cannot meet a companion or height restriction if the ride is subject to such a restriction. Legible signs to this effect shall be posted in full view of the public seeking admission to major or super rides.

(d) The following sign shall be placed in a conspicuous public place on or near the ride at a height that is easy to read.

1. "State law requires that each rider must obey all written warnings and directions regarding this ride and refrain from behaving in a reckless manner which may cause or contribute to injury to the rider or others. Failure to comply is a violation of law and subject to penalty under the New Jersey Code of Criminal Justice pursuant to N.J.S.A. 5:3-36.1. Violators may be subject to a fine of up to $1,000 and imprisonment of up to 6 months."

2. This sign is in addition to any other required signage per this chapter.

5:14A-9.34 Warning sign

(a) On major or super rides that expose a rider to high speed, substantial centrifugal force or a high degree of excitement, the owner shall post a conspicuous warning sign at the entrance of the ride advising the public of the potential risk to riders.

(b) The signs required shall be in sharply contrasting colors and be legible to a person of normal vision standing at a point of entrance to the ride.
(c) The sign required by this section shall read as follows or express an equivalent warning:

"Normal operation of this ride may be hazardous to the following people:
Those who are pregnant;
Those with heart conditions;
Those with serious back problems;
Those subject to motion sickness; or
Those with other health problems that may make them more vulnerable to injury.

The following people shall not use this ride:
Those under the influence of alcohol or drugs."

1. Exception: Signs installed before October 1, 2002 and conforming to N.J.A.C. 5:14-5.11 may continue to be used until they are replaced on a normal replacement basis.

(d) Operators and operator assistants are responsible for the maintenance of signage in or around the ride. Rides and attractions requiring signs inside each vehicle instructing riders of the safest way to ride shall be maintained at all times. If any vehicle is missing the safety signage, the vehicle should be tagged "Out of Service" until the sign can be replaced.
(e) All rides and attractions shall have a legible sign in plain view of the riding public indicating the height restriction for that ride. Any other limitations on who can use the ride shall be clearly stated on the sign.
(f) The owner or operator shall not post any sign that prohibits or discourages any handicapped or physically challenged person from using the ride, provided, however, that this prohibition shall not apply to any notice of manufacturer's requirements for safe use of the ride.

SUBCHAPTER 10. SPECIAL PROVISIONS FOR BUNGEE JUMPING OPERATIONS

5:14A-10.1 Title; scope; intent

(a) This subchapter, adopted pursuant to the authority of the Carnival-Amusement Rides Safety Act and entitled "Special Provisions for Bungee Jumping Operations," shall be known and may be cited throughout the rules as N.J.A.C. 5:14A-10 and when referred to in this subchapter may be cited as "this subchapter."
(b) This subchapter establishes special rules to maximize safety for bungee jumpers and spectators while bungee jumping operations are in progress.
(c) The scope of this subchapter shall be to set forth specific rules applicable to bungee jumping operations. These rules shall be in addition to the general provisions of the rules governing carnival and amusement rides in this chapter. Where a specific provision covering bungee jumping conflicts with the general provisions of this chapter, the provision set forth in this subchapter shall govern.

5:14A-10.2 Definitions

When used in this subchapter, the following words and terms shall have the following meanings, unless the context clearly indicates otherwise:

"Air bag" means a device that cradles the body using a multi-cell release breather system to dissipate the energy due to a fall, thereby allowing the jumper to land without an abrupt stop or bounce.

"Approved operating site" means the area of bungee jumping operations including the preparation area, the jump space, the landing area, and the recovery area as shown on the site plan drawings submitted by the operator pursuant to this chapter with the registration of a bungee jumping operation and as approved by the Department.

"Binding" means material tied together and attached to the bungee cord and used to wrap and hold together the jumper's ankles.

"Bungee cord" means the elastic rope attached to the jumper that lengthens and shortens to produce a bouncing action.

"Bungee cord end connections" means a static line runner commonly made from tubular nylon webbing.

"Bungee jumping" means the activity where a person free falls from a height and the person's descent is limited by his or her attachment to a bungee cord.

"Bungee jumping operation" means all activity associated with bungee jumping.

"Equipment" means each component of a bungee jumping operation, including power or manually operated devices to raise, lower and hold loads.

"Harness" means an assembly to be worn by a jumper and attached to a bungee cord.

"Jump master" means a person at least 18 years of age who is responsible for the supervision and control of the entire bungee jumping operation.

"Jump operator" means a person at least 18 years of age who assists the jump master preparing a jumper for bungee jumping.

"Jump point" means the position from which the jumper leaps from the platform.

"Jumper" means a person at least 18 years of age who leaps from a platform while attached to a bungee cord.

"Landing area means the surface area on which the jumper is lowered.

"Platform" means the designated part of the structure from which the jumper leaps.

"Preparation area" means a separate area on the support structure or part where the jumper is prepared for bungee jumping.

"Recovery area" means an area near the landing area where the jumper may choose to recover from the jump before exiting the bungee jumping operation site.

"Scale" means a weighing device which has been approved as to type, construction and operation by the Superintendent of the State Office of Weights and Measures pursuant to N.J.S.A. 51:1-93.

"Structure" means a permanent building or tower used for bungee jumping.

5:14A-10.3 Prohibited activities, practices and conditions

(a) The following activities, practices, and conditions shall be prohibited:

1. Catapulting, launching or reverse jumping, which shall mean the practice of stretching the bungee cord while attached to the jumper who is held on the ground, and then released and propelled upward;
2. Double or tandem jumping, which shall mean the practice of two or more individuals jumping simultaneously from the same jump platform, whether from a common bungee cord or individual bungee cords;
3. Sandbagging, which shall mean the practice of loading excess weight to a jumper intending to release the excess weight at the bottom of the jump, thus gaining extra momentum on the rebound;
4. Stunt jumping, which shall mean combining any other activity with bungee jumping;
5. Bungee jumping from a mobile or fixed-type crane or lifting device not designed, approved or manufactured to carry, transport or, in any fashion, move a person;
6. A bungee jumping operation that is in violation of any Federal, State or local law or regulation with respect to any part of its operation;
7. Any bungee type not specifically approved by the Department;
8. More than two persons shall not be allowed on the jump point, except that one additional employee who is approved for training shall be allowed for training purposes only; and
9. A bungee jumping operation that is exposed to wind velocity exceeding 25 miles per hour, or other dangerous weather condition;
    i. Wind velocity shall be measured by an anemometer mounted on the tower at least as high as the jump point and shall be capable of being read from ground level as well as the jump point.

5:14A-10.4 Inspection fee and permit fee

An owner of a bungee jumping operation shall comply with all provisions of N.J.A.C. 5:14A-2 pertaining to inspection and permitting procedures and requirements, except that the inspection fee for a bungee jumping operation shall be $1,000.00 and a duplicate permit fee shall be $50.00.

5:14A-10.5 Operating manual

(a) There shall be an operating manual for the safe operation of bungee jumping on the each site of a bungee jumping operation. The manual, including all amendments, shall be held on the site and shall be freely available to the Department.

(b) The manual shall include, but not be limited to, the following:

1. A site plan;
2. A description of operating system and equipment;
3. Job procedures for each task in the operating system;
4. Job descriptions;
5. Maintenance inspection records;
6. Testing procedures and recording;
7. Criteria for the periodic maintenance or replacement of rigging, hardware, bungee cords, harnesses, or lifelines as required by the manufacturer;
8. An emergency plan and procedures;
9. Reports of injuries, damage, and incidents;
10. Bungee cord and equipment log books;
11. Inspection procedures, standards, and follow-up actions;
12. Instructions for setting up the site equipment;
13. Lists of all staff, including their qualifications and training; and
14. Testing and checking procedures for the following:
    i. Personnel protective equipment including gloves, harnesses, and life lines;
    ii. The communication system(s)-communications shall be maintained between all operations personnel involved with the actual jump. For example, the jump master and jump operator shall be in communication at all times by way of telephone or radio;
    iii. Jump equipment and rigging;
    iv. Telephone service to reach emergency medical personnel;
    v. Documentation of test jumps and bungee cord performance;
    vi. Documentation of staff briefing for the day's operations; and
    vii. Exclusion of the public from the operating areas.

5:14A-10.6 Insurance, bond or other security

An owner of a bungee jumping operation shall adhere to all of the provisions found at N.J.A.C. 5:14A-2.9 pertaining to insurance, bond or other security.

5:14A-10.7 Engineering review

(a) Before an engineering review can be conducted, the following shall be submitted to the Department:

1. One complete set of ride drawings signed and sealed by a licensed professional engineer;
2. One complete set of ride design calculations signed and sealed by a licensed professional engineer, including local environmental conditions;
3. A NDT Statement; and
4. Fixed site requirements, including
    i. Foundation drawing(s) and calculations or a letter signed and sealed by a New Jersey licensed professional engineer certifying that the existing foundation, pad, or other support structure supports the ride in all conditions;
    ii. Soil data for rides for which new foundation work was required; and
    iii. One copy of the applicable Uniform Construction Code Certificate of Occupancy or Certificate of Approval.

5:14A-10.8 Engineering certification

(a) An engineering certification shall be required before a bungee jumping operation shall function in this State.
(b) An application for an engineering certification for a bungee jumping operation shall include two copies of the following documents, signed and sealed by a licensed professional engineer:

1. Certification of the hoisting equipment, tower or other methods of hoisting or suspension;
2. A plot plan of the jump site within 200 feet of a bungee jumping operation;
3. Schematic drawings of structure foundation and load bearing certification;
4. An elevation schematic and calculations of G forces, bungee height and safety zone between maximum bungee elongation and air bag;
5. Certification of all equipment used in a bungee jumping operation, such as bungee ropes, harnesses, carabiners, and straps;
6. Certification of operation, training and maintenance manuals;
7. Certification of inspection of the entire bungee jumping operation and equipment;
8. Certification that documents that design and construction are in accordance with accepted engineering practices, and that all reasonably foreseeable hazards have been guarded against in design; and
9. A definitive statement by a professional engineer that the bungee jumping operation is safe and acceptable to operate with the equipment identified in the submittal.

5:14A-10.9 Mechanical equipment

(a) Scales:

1. Scales shall be tested and sealed by a New Jersey Weights and Measures officer at least once a year; and
2. Scales shall be tested using certified test weights before the opening of the ride each day.

(b) Weights:

1. Each bungee jumping operation shall obtain test weights that have been tested and sealed by the Superintendent of the State Office of Weights and Measures in the aggregate capacity of 300 pounds.

(c) Bungee cords:

1. Operating testing: All commercial operators shall follow the inspection and testing recommendations set forth by the bungee cord manufacturer;
2. All bungee cord manufacturers shall provide specifications to purchasers on maximum usage of bungee cords expressed in number of jumps;
3. Bungee cords shall be retired when the bungee cords exhibit deterioration or damage or when maximum usage expressed in number of jumps as specified by the manufacturer is reached, whichever is first. All commercial operators shall have an auditable system for recording the number of jumps on each individual bungee cord in use. This data shall be readily available to the Department upon request; and
4. Bungee cords retired from use shall be destroyed by cutting the bungee cord into five-foot lengths.

(d) Bungee cord end connections:

1. All bungee cord end connections shall be of a size and shape to allow easy attachment to the harnesses and to the rigging. On multiple cord systems, each bungee cord shall meet its own independent end connection;

2. All bungee cord end attachment points subject to wear shall be retired when the bungee cord is retired;

3. On multiple bungee cord systems, all bungee cord end attachment points shall be bound together in a protective sheath that allows the individual ends to move with respect to each other; and

4. All bungee cords shall be inspected each day for wear, slippage, or any other abnormalities, unless the manufacturer specifies more frequent inspections.

(e) Harnesses:

1. A harness shall be either:

i. A full body harness; or

ii. An ankle harness or ankle strapping that is tied off in such a manner so as to secure the jumper to the cord end connection. The ankle harness/strapping shall evidence redundancy. A link to a waist harness shall be required;

2. No harness shall cause bruising;

3. Harnesses shall be available to fit the range of jumper sizes accepted for jumping;

4. The harness shall have a minimum breaking strength of 4,000 pounds, shall be suitable for the type of jumping conducted, and shall be manufactured by an organization approved to manufacture similar harnesses to an approved standard; and

5. Each harness shall be inspected prior to harnessing a bungee jumper and shall be removed from service when it exhibits signs of excessive wear, damage, or when it has met the manufacturer's maximum usage allowance.

(f) Carabiners and locking devices:

1. Specification: Carabiners shall be of the screw type lock with a minimum main axis breaking strength of 8,000 pounds;

2. Use: A minimum of two carabiners shall be used at each bungee cord end connection point;

3. Design and construction: All carabiners shall be designed and constructed using the existing standards for mountaineering and rescue gear; and

4. Testing: All carabiners shall be inspected daily and shall be removed from service when the locking mechanisms fail to lock properly, the springs are worn, or the locking gates deform.

(g) Anchors:

1. Specifications: There shall be two anchors that attach the bungee cord to the structure. Each anchor shall have a minimum strength of 8,000 pounds or shall be designed with a minimum factor of safety of five, whichever is more. There shall be a carabiner that attaches each anchor to the bungee cord end connections. The two carabiners shall not be connected to each other;

2. Where wire rope is used, it shall have staged ends with a thimble eye or it shall be continuous. Other connection systems shall be acceptable if they meet the aforementioned strength specifications; and

3. Daily inspection of the anchors shall be carried out, and any portion showing signs of excessive wear shall be removed from service immediately.

(h) Air bags:

1. An air bag shall be provided; and

2. A minimum of a 10-foot safety zone shall be maintained above the air bag.

(i) Platforms:

1. Platforms shall be constructed to provide safety and security to the public. Every platform shall:

i. Be completely enclosed except for the jumping off area;

ii. Have a nonskid floor surface;

iii. Be provided with a gate equipped with locking devices to prevent accidental openings;

iv. Be provided with anchor rails or points to secure the bungee jumper prior to the bungee jump;

v. Have no more than two persons on the platform during bungee jumping operations, the bungee jumper, and bungee jump master. A third person, who shall be an employee, may be added only for training and instruction purposes;

vi. Be permanently attached to a structure; and

vii. Be constructed so that the bungee jump point shall not exceed 100 feet above the ground surface.

(j) Rescue procedures: All operations regardless of jump platform in use shall have a secondary retrieval system. All appropriate staff shall be trained on proper rescue procedures. Prior to bungee jumping operations, all appropriate staff shall conduct a test rescue.

5:14A-10.10 Communication

Radio communication shall be provided between the jump master and the jump operator(s).

SUBCHAPTER 11. GO-KART OPERATIONS

5:14A-11.1 Title; scope; intent

(a) This subchapter, adopted pursuant to the authority of the Carnival-Amusement Rides Safety Act and entitled "Go-Kart Operations," shall be known and may be cited throughout the rules as N.J.A.C. 5:14A-11, and when referred to in this subchapter may be cited as "this subchapter."

(b) The purpose of this subchapter is to provide the standards necessary for the safety of go-kart drivers, riders, and the general public.

(c) The scope of this subchapter shall be to set forth specific rules applicable to go-kart operations that shall be adhered to in addition to the general provisions of the rules governing carnival and amusement rides in this chapter. Where a specific provision covering go-karts conflicts with the general provisions of this subchapter, the provisions set forth in this subchapter shall govern.

5:14A-11.2 Control of operations

Each go-kart operation shall be equipped with a device to control all vehicles on the track. The device shall be capable of placing vehicles in an idle mode and preventing acceleration in the event of an emergency. This device shall be under the sole control of the operator.

5:14A-11.3 Driver limitations

At go-kart tracks where the design speed is 25 miles per hour (mph) or more, all drivers shall possess a valid driver's license and shall show such driver's license to the operator prior to entering the go-kart.

5:14A-11.4 Adoption as amended, of ASTM practice F 2007-00

(a) The Standard Practice for the Classification, Design, Manufacture, and Operation of Concession Go-Karts and Facilities, designated by the American Society for Testing and Materials (ASTM) as F 2007-00, is adopted by reference, as amended, and made part of this subchapter and shall be enforced as part of this subchapter.

(b) Notwithstanding any provisions stated in the standard, where specific provisions of the standard conflict with the provisions expressly set forth in this chapter, the provisions set forth in this chapter shall govern.

(c) The standard shall be amended as follows:

1. Section 5.5- insert ", or normal operation" after "rollover";
2. Section 5.6- delete "or" after "go-kart" insert "and";
3. Section 6.2- delete the phrase "free of vertical misalignment greater than ¾ in within 1 in. horizontal distance" and insert "maintained in good repair and free of cracks, obstructions and/ or potholes which could damage the cart or cause the rider/driver to lose control of the vehicles". Delete the phrase "material that cannot be moved or displaced by normal go-kart operation" and insert "solid asphalt or concrete binding material";
4. Section 6.3- delete "on the same horizontal plane for classes of concession go-karts 2,3,4, or 5, with the exception of the entrance and exit points of the pit area" and insert "of the cart track which allow or enable go-karts on a go-kart track to cross one another in opposite directions on the same track plan";
5. Section 6.10.1 delete "may" and insert "shall". Add the phrase "but not be limited to," after the word "include";
6. Section 6.11- delete "may" and insert "shall"; and
7. Section 7.16- delete "of greater than ¾ in. in vertical change within a 1 in. horizontal distance,".

(d) The ASTM standard F 2007-00 may be obtained from:

American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959

SUBCHAPTER 12 WATER PARK REQUIREMENTS (RESERVED)

SUBCHAPTER 13. INFLATABLE RIDES

5:14A-13.1 Title; scope; intent

(a) This subchapter, adopted pursuant to authority of the Carnival-Amusement Rides Safety Act and entitled "Inflatable Rides," shall be known and may be cited throughout the regulations as N.J.A.C. 5:14A-13, and when referred to in this subchapter may be cited as "this subchapter."

(b) The purpose of this subchapter is to provide reasonable standards for the design, construction, and operation of inflatable amusement rides as a separate class of rides. The requirements contained in this subchapter are intended to supplement the requirements found in the balance of this chapter.

(c) This subchapter shall apply to inflatable devices that are designed to allow riders to bounce, slide or be supported on them. The structures shall be fabricated from flexible material, kept inflated by one or more blowers, and rely on air pressure to maintain their shape.

(d) When an individual component may be used as a stand-alone ride, the review, registration, permitting, and inspection of attachable rides shall be based on the individual components of the ride.

5:14A-13.2 Type classification

(a) Air-supported structures shall be classified as one of the following four types:

1. Type 1 shall be air-supported structures that are
   i. Either sealed or continuously or intermittently inflated; and
   ii. Are intended to have no human inside or supported by it during operation.
   iii. Examples shall include, but not be limited to, ball throws and golf simulators;
2. Type 2 shall be air-supported structures that are either
   i. Sealed or continuously or intermittently inflated; and
   ii. That allow entry by the public, but where the public is not supported by the structure. Occupants stand on the ground.
   iii. Examples shall include, but not be limited to, inflatable buildings and entrance gates;
3. Type 3 shall be air-supported structures that are sealed, and
   i. Are intended to be occupied or ridden by the public; and
   ii. That the public enters or mounts.
   iii. Examples shall include, but not be limited to, pillows and ball crawls; or
4. Type 4 shall be air-supported structures that are continuously or intermittently inflated by a mechanical device, and:
   i. Are intended to be occupied or ridden by the public; and
   ii. That the public enters or mounts.
   iii. Examples shall include, but not be limited to, moonwalks and inflatable slides.

(b) Air-supported structures, Type 4, as described in (a) above, shall be considered amusement rides, regardless of their location, and shall comply with this subchapter.

(c) Air-supported structures, Types 1 and 2, as described in listed in (a) above, shall not be considered rides.

1. A building permit pursuant to the Uniform Construction Code, N.J.A.C. 5:23, shall be required for a tensioned membrane structure of more than 900 square feet or greater than 30 feet in any dimension or of any size if it contains appurtenances such as platforms or electrical equipment.
2. Owners may apply for a ride permit in lieu of a building permit when such structures are to be located with amusement rides subject to the Act.

(d) Air-supported structures, Type 3, as described in (a) above, shall be considered amusement rides only when located with other rides covered by the Carnival-Amusement Rides Safety Act.

1. A building permit pursuant to the Uniform Construction Code, N.J.A.C. 5:23, shall be required when such a structure is not located with other rides covered by the Carnival-Amusement Rides Safety Act and the structure is more than 900 square feet or greater than 30 feet in any dimension or of any size if it contains appurtenances such as platforms or electrical equipment.

5:14A-13.3 Type certification

(a) Prior to selling the units to ride owners in the State, manufacturers shall obtain from the Department the applicable type certification for their inflatable rides.
(b) Registration of one inflatable ride design per application is required.
(c) Manufacturers shall submit the following documentation for each inflatable ride:

1. An illustration or picture of the ride;
2. A description of the ride (height, width, length, and, if applicable, slide length);
3. Calculations for tie-down requirements for both soft and hard surfaces with a list of the requirements;
4. Operation, maintenance, and set-up manuals as required by N.J.A.C. 5:14A-2.14 and 13.6;
5. Design calculations per inflatable ride, or class of ride if the wind load areas are comparable, indicating the number of anchorage points and anchor size based upon live and wind loads. The calculations shall be signed and sealed by a licensed professional engineer; and
6. Flame resistant standards to which all materials used in the fabrication of the ride were tested and which those fabrics passed. Fabric manufacturer test certifications shall be available from the ride manufacturer for each inflatable unit.

5:14A-13.4 Individual approval

An owner may apply for an individual approval of a ride that has not been type certified. Such application shall contain the same information required for type certification in N.J.A.C. 5:14A-13.3.

5:14A-13.5 Design and construction

(a) The inflatable ride shall be constructed to sustain appropriate design loads.
(b) The inflatable ride design shall ensure that no parts of the device or ancillary equipment, such as sharp edges or exterior angles, are accessible to users that may cause injury if contact is made with them.
(c) The inflatable ride design shall have no significant trapping points between adjacent surfaces.
(d) The outside walls shall be sufficient in height and strength, and shall be attached to the base, to prevent riders from bouncing over the wall and to prevent the wall from collapsing if run into by a rider.

1. When the inflatable ride design allows for jumps, obstacles, or other structures upon which a rider may climb, the ride shall provide an extended base or floor beyond the main area of the ride to ensure that the rider does not fall outside the ride.

(e) The number and maximum size or weight of riders that the structure can safely hold at any one time shall be specified in the operating manual.
(f) The design shall be such that no one can be injured or trapped by deflation, and deflation time shall be sufficient to allow the structure to be safely evacuated.
(g) Designs with open fronts that serve as both an entrance and an exit to a ride shall have a safety mat if the base of the inflatable ride is more than 7.5 inches above the ground. The minimum distance this “step” shall extend from the inflatable ride shall be 36 inches.

5.14-13.6 Manuals

(a) The operations manual shall contain a description of the ride, its intended use, and full operating instructions. At a minimum, the manual shall contain:

1. The number of required operators;
2. An emergency evacuation plan;
3. Disassembly, cleaning and storage instructions;
4. Information on setting up and maintaining the inflatable ride may be in the operations manual or in separate maintenance and erection and assembly manuals;
5. Instructions and drawings that clearly describe the steps to be followed in the assembly and inflation, and the disassembly and deflation; and
6. The number of anchorage points per inflatable ride.

5:14A-13.7 Anchorage

(a) The number of anchorage points per inflatable ride shall be clearly indicated and pictured in the manuals.

(b) The size and number of anchorage points shall be adequate for the structure, and take into account live and wind loads.

(c) Anchors may be straight stakes, screw stakes, ground weights or sandbag ground anchors, and shall be specifically described within the inflatable ride design documents. If substitutions are allowed by the manufacturer, such substitutions shall be clearly indicated in the design documents and manuals

(d) Ground stakes shall be a minimum of 40 inches long for slides 15 feet or higher.

(e) Manufacturers shall include one set of ground anchors with each inflatable ride.

(f) All anchors shall be protected to prevent them from being a hazard to the public.

5:14A-13.8 Ride loading and unloading

(a) Safe and adequate means of loading and unloading from amusement rides shall be provided.

(b) For completely enclosed, dark structures:

1. Exits shall be marked by readily visible signs in compliance with IBC 2000, Section 1003.2.10 in all cases where it is not immediately visible to the riders;
2. An independent system shall be provided for any lighting, emergency lighting, and loudspeaker system;
3. The electrical installation shall conform to Article 700 of the electrical subcode; and
4. Structures designed to accommodate more than 50 people shall have more than one exit at opposite ends or sides. All additional exits shall be clearly marked as exits and shall have a latching gate, door, or an operator to prevent entrance at that point.

(c) For structures not covered by (b) above:

1. Entrances and exits shall be clearly marked as such and shall be staffed at each location;
2. Riders waiting to board the ride shall be in a controlled area and shall not be permitted to gather around the entrance; and
3. If rides have exits as well as entrances, the exit shall be staffed and a fenced area shall direct riders away from any equipment, such as generators or transportation equipment.

5:14A-13.9 Materials

(a) Knitted and woven fabrics, whether coated or uncoated (such as netting, webbing, and fabrics) shall meet the specifications of NFPA 701, Standard Methods of Fire Test for Flame Resistant Textiles and Films, or an equivalent standard.

(b) Foam padding shall meet the requirements of ASTM F 1918, Section 11.5.2

5:14A-13.10 Electrical equipment, wiring and generators

(a) Blowers shall be specific to the inflatable ride to avoid over inflation and possible rupture or under inflation, and shall be suitably guarded at the inlet and outlet. Blowers shall not be sited internally unless they are in a part of the structure not used by riders and out of possible contact with riders.

(b) Extension cords shall be of minimum length, proper gauge, and connected to a GFCI (ground fault circuit interrupter) receptacle.

(c) Extension cords shall not be connected.

(d) Extension cords shall be protected and secured so as not to present a tripping hazard.

(e) When an electrical generator is used, the generator shall :

1. Be in good operating condition;
2. Be free from leaks;
3. Have a proper spark arresting muffler arranged such that the exhaust fumes are directed away from the blower intake;
4. Have circuit protection with ground fault interrupt outlets; and
5. Be located at a safe distance from the inflatable ride and the public.

(f) All riders shall be removed from the inflatable ride during refueling of the generator.

5:14A-13.11 Fire prevention

Fire prevention shall be provided per N.J.A.C. 5:14A-9.23.

5:14A-13.12 Identification and data plate

(a) Every inflatable ride shall have an identification and data plate attached to it that is either sewn or glued to the unit. The identification and data plate shall include the following information:

1. The name and address of manufacturer;
2. The ride name;
3. The ride serial number;
4. The date of manufacture;
5. The rider capacity by weight and number;
6. The cubic feet per minute (CFM) required to properly inflate the ride;
7. The type of blower to be used; and
8. The flame resistant standards by which all materials used in the fabrication of the ride were tested and passed.

5:14A-13.13 Assembly and disassembly

(a) A thorough check of the inflatable ride and its accessories shall be carried out by a qualified person before its use. This check shall ensure that all anchor points, anchor ropes, and anchor stakes or ballasts are undamaged and suitable for continued use.

(b) Illustrations and detailed instructions shall be provided for setting up an inflatable ride.

(c) Anchorage requirements:

1. Stakes or ballast shall be used at every anchorage point and shall be installed per manufacturer requirements;
2. Stakes with restraining hooks or collars at the top shall be used to prevent the attached rope from sliding up and releasing; and

3. Anchoring shall not create a tripping hazard.

(d) All tie-down ropes attached to the inflatable ride shall be fastened to a stake or anchorage. Any rope that becomes detached from the structure shall be replaced with ropes of at least equivalent breaking strength, and shall be attached with equivalent or greater attachment strength.

(e) During assembly, proper clearance on all sides and top of the inflatable ride shall be observed as per the manufacturer's requirements and N.J.A.C. 5:14A-9.14.

5:14A-13.14 Auxiliary equipment

(a) Specification sheets for auxiliary components, including, but not limited to, harnesses, bungee cords, carabineers and other fasteners that support or limit riders on inflatable rides shall be provided. The specification sheets shall include:

1. The life cycle of component;
2. The conditions that would indicate mandatory replacement of component; and
3. Instructions indicating proper replacement procedures.

5:14A-13.15 Operation

(a) Notice shall be provided as per N.J.A.C. 5:14A-9.2.

(b) Daily inspection and testing shall be provided as per N.J.A.C. 5:14A-9.3.

(c) Inflatable rides shall comply with N.J.A.C. 5:14A-9.6, as applicable.

(d) Control of operation shall be as follows:

1. Operators shall operate only one inflatable ride at a time;
2. Operators shall be stationed at the exit as well as the entrance when the exit and entrance are in different locations not easily viewed and controlled from one location; and
3. On slides over 15 feet from the top of the sliding surface to the ground, an operator shall be stationed at the top of the slide.

(e) Operators shall not mix small riders with larger riders whose actions could cause injury to the smaller riders.

(f) Operators shall not allow riders to flip.

(g) Operators shall not allow any rider to wear shoes on an inflatable ride.

(h) Provisions shall be made to ensure that riders cannot conceal themselves from the operator’s view.

(i) Wind and storm hazards:

1. In the event of an approaching thunderstorm, gusting or sustained wind, rain, or any other hazardous weather related condition, inflatable rides shall be evacuated and deflated; and
2. After the weather condition passes, the inflatable ride shall be dried of rainwater, re-inflated, re-inspected by the operator and shall be re-opened when deemed safe to operate.

(j) Imminent danger:

1. Inflatable rides shall not be placed under power lines;
2. Inflatable rides shall be placed a reasonable distance from roadways or motor vehicle traffic;
3. Inflatable rides shall have the proper manufacturer-recommended ground cover, and shall not be set up on a surface that could puncture the structure and cause sudden deflation;
4. Areas in which inflatable rides are used shall be sufficiently lighted; and
5. Inflatable rides shall be placed on relatively level ground.

(k) Cleanliness:

1. Inflatable rides shall be cleaned as per manufacturer's specifications on a regular basis; and

2. The air intake filter screen on the blower unit shall be free of debris at all times.

(l) Rider Conduct:

1. Warning signs: On inflatable rides that require physical exertion by the riders, the owner shall post a conspicuous warning sign at the entrance of the ride advising the public of the risk to participants;

2. All operators and operating assistants shall be aware of and understand the use of and reasoning behind the required warning sign; and

3. The sign posted shall comply with the requirements of N.J.A.C. 5:14A-9.34, and shall include “NO FLIPS”.

(m) All rides shall have a legible sign in plain view of the riding public indicating the height restriction for that ride.